ESSAYS ON
U.S. FEDERAL HOUSING CREDIT POLICY

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

Andrew Jack Fieldhouse

May 2019

ESSAYS ON

U.S. FEDERAL HOUSING CREDIT POLICY

Andrew Jack Fieldhouse, Ph.D.

Cornell University 2019

Congress has heavily intervened in U.S. mortgage markets ever since the Great Depression, when federal housing credit policies were first deployed to resuscitate housing and mortgage markets. Congress chartered federal agencies and government-sponsored enterprises (GSEs) to promote access to mortgage credit by purchasing or guaranteeing mortgages. Since the onset of the Great Recession the Federal Reserve has conducted its own form of housing credit policy aimed at reducing the cost and increasing the availability of mortgage credit: large-scale purchases of government agency mortgage-backed securities (MBS). Whereas monetary policy targets a term structure of risk-free interest rates, credit policies aim to alter the allocation of credit by absorbing or subsidizing lending risks. Government purchases of mortgage debt might simply displace private mortgage lending, or housing credit policies could channel resources toward housing by subsidizing a reduction in mortgage risk premia.

Despite the federal government's expansive use of housing credit policies, evidence on the macroeconomic effects of government mortgage purchases has been constrained by an identification problem. Regressing housing or mortgage market activity on government agency mortgage purchases would capture reverse causality bias arising from policy endogeneity and profit motives; these sources of reverse causality bias would similarly undermine common macroeconometric identification strategies. Studying the Fed's MBS purchases during

the Great Recession faces related intrinsic challenges. My dissertation develops a novel identification strategy to circumvent these challenges to inference regarding the macroeconomic effects of government agencies purchasing or selling mortgage debt. I construct instrumental variables from observable policy interventions over 1967–2006 and use them to tease apart the intended versus unintended causal effects of government purchases of mortgage debt.

The novel identification strategy underpinning my dissertation is a narrative analysis of regulatory policy changes affecting government agency purchases of mortgage debt. The narrative approach to time series identification exploits the historical record for exogenous policy shocks, as opposed to backing out shocks from latent variables with modeling assumptions or statistical techniques. I contribute the first narrative analysis of U.S. housing credit policies, using primary sources to identify and quantify regulatory shocks affecting the mortgage holdings of Fannie Mae, Freddie Mac, Ginnie Mae, the Federal Reserve, and the U.S. Treasury Department. Regulatory policy changes that I classify as not cyclically motivated are intended as instrumental variables for government agency mortgage purchases, circumventing concerns about reverse causality bias.

The first chapter of my dissertation exploits identifying variation from my narrative analysis to document whether government mortgage purchases advance stated housing policy objectives and to study interactions with monetary policy. We find that agency purchases boost total mortgage lending and lower mortgage rates, indicating that policymakers are capable of directing credit toward housing, as intended, as opposed to simply crowding out private mortgage lending. Agency purchases also advance periodic policy objectives of increasing housing starts and homeownership rates. We identify similarities in the transmission of monetary policy shocks and agency mortgage purchases,

and document significant interactions between monetary and housing credit policies; Congress frequently used cyclically motivated credit policies to cushion housing and mortgage markets from contractionary monetary shocks.

If housing credit policies expand targeted lending volumes by subsidizing or absorbing private credit risks, they may inadvertently reduce other lending. My second dissertation chapter empirically tests whether the mortgage purchases of Fannie Mae and Freddie Mac unintentionally displace commercial lending and related real activity by subsidizing an expansion in mortgage lending. I use my narrative analysis for exogenous variation in the mortgage purchases of Fannie and Freddie. Regulatory shocks to GSE mortgage purchases boost private home mortgage lending yet unintentionally reduce commercial real estate and business lending. U.S. housing credit policies similarly reallocate construction activity toward housing and away from commercial real estate, negating any intended stimulus to aggregate construction spending or employment.

The third chapter of my dissertation is the narrative analysis underpinning the identification strategies behind the first two chapters.

My findings are relevant to efforts in Congress to resolve the fate of Fannie and Freddie, as well as to the ongoing reduction in the Fed's MBS holdings. Government agency mortgage purchases are capable of increasing mortgage borrowing, reducing mortgage rates, boosting housing investment, and raising homeownership rates, as intended, through a subsidy channel. Subsidizing mortgage borrowing, however, involves an unintended tradeoff with respect to commercial lending and commercial real estate investment. Government agency mortgage purchases appear ineffectual as a tool of stabilization policy—as they have been employed on and off since the Great Depression.

BIOGRAPHICAL SKETCH

Andrew Fieldhouse joined the doctoral program in the Department of Economics at Cornell University in the fall of 2013. His broad research interests are in applied macroeconomics, monetary and fiscal policy, and public finance, and his doctoral research focused on federal credit policy interventions in U.S. mortgage markets. Prior to pursuing his doctorate, Mr. Fieldhouse worked on a range of U.S. federal tax and budget policy issues as a Federal Budget Policy Analyst with the Economic Policy Institute and The Century Foundation in Washington, D.C. He previously worked as an Assistant Budget Analyst and a Research Assistant with the U.S. House of Representatives Committee on the Budget, Majority Staff. He holds a Bachelor of Arts with majors in Economics and Political Science from Swarthmore College, where he graduated with high honors, and a Master of Arts in Economics from Cornell University.

This document is dedicated to Ann and Richard Fieldhouse.

ACKNOWLEDGEMENTS

I am deeply indebted to my special committee members and mentors Karel Mertens, Kristoffer Nimark, Andrew Karolyi, and Levon Barseghyan for their considerable support and guidance. I am especially grateful to Karel Mertens, my committee chair and co-author, for teaching me so much, both about empirical macroeconomic research and navigating the economics profession. And I am ever appreciate of Kristoffer Nimark, my committee co-chair, for personally investing so much in the professional development of the macroeconomics graduate students at Cornell University.

I thank my former professors Amanda Bayer, Erin Todd Bronchetti, John Caskey, Thomas Dee, Stephen Golub, Robinson Hollister, Phillip Jefferson, Mark Kuperberg, Stephen O'Connell, and Larry Westphal for first fostering my enthrallment with economics while at Swarthmore College. I additionally thank Josh Bivens, John Irons, Lawrence Mishel, and former colleagues at the Economic Policy Institute for helping to propel me toward a Ph.D. and launch my career as an economist.

I gratefully acknowledge the Department of Housing and Urban Development, National Archives and Records Administration, Shane Sherlund, William English, Malin Hu, and Christoffer Koch for providing data. I also thank Isha Agarwal, Elliot Anenberg, Cassandra Benson, Dario Caldara, John Caskey, Stephen Coate, John C. Driscoll, James Elwell, Stephen Golub, Aurel Hizmo, Christopher Huckfeldt, Matteo Iacoviello, Mark Kuperberg, Stephen O'Connell, Wayne Passmore, Alexander W. Richter, Daniel R. Ringo, Tess C. Scharlemann, Mathieu Taschereau-Dumouchel, Eric Zwick, and seminar participants at Cornell University, Swarthmore College, Cornell-Penn State Macro Conference, OFCE Workshop on Empirical Monetary Economics, Federal Reserve Bank of

Dallas, and Federal Reserve Board of Governors for valuable comments. I appreciate the hospitality of the Federal Reserve Bank of Dallas and the Federal Reserve Board of Governors, where parts of my doctoral research were conducted. Research support was provided in part by the L.R. "Red" Wilson endowment, Cornell University Graduate School, and Federal Reserve Board of Governors. The views in this dissertation are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Dallas or the Federal Reserve System.

I thank my parents, Ann and Richard Fieldhouse, for their boundless love and support, and for instilling curiosity and always deeply valuing education; your respective enthusiasm for teaching and public policy certainly wore off. And I thank Heidi Vanden Brink for helping me through this degree and this dissertation in a myriad of ways; your encouragement, support, and companionship means the world.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

THE MACROECONOMIC EFFECTS OF GOVERNMENT ASSET PURCHASES: EVIDENCE FROM POSTWAR U.S. HOUSING CREDIT POLICY*

Andrew J. Fieldhouse, Karel Mertens, and Morten O. Ravn

Abstract: We document the portfolio activity of federal housing agencies and provide evidence on its impact on mortgage markets and the economy. Through a narrative analysis, we identify historical policy changes leading to expansions or contractions in agency mortgage holdings. Based on those regulatory events that we classify as unrelated to short-run cyclical or credit market shocks, we find that an increase in mortgage purchases by the agencies boosts mortgage lending, in particular refinancing, and lowers mortgage rates. Agency purchases also influence prices in other asset markets, stimulate residential investment, and expand homeownership. We compare these effects to those of conventional monetary policy shocks, and we provide evidence on the interactions between housing credit and monetary policies.

*For a final version of this paper, visit: `https://academic.oup.com/qje/article-pdf/133/3/1503/25112590/qjy002.pdf`

Citation: Fieldhouse, Andrew J., Karel Mertens, and Morten O. Ravn. 2018. "The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar U.S. Housing Credit Policy," *The Quarterly Journal of Economics*, 133 (3): 1503-1560.

1.1 Introduction

The residential mortgage market in the United States is one of the largest capital markets in the world and by far the dominant source of credit for American households. The mortgage market finances housing, which is a key component of both household wealth and aggregate spending, see e.g. Leamer (2007). Many accounts of the causes and propagating factors of the 2007/08 financial crisis assign an important role to a boom and bust in the availability of mortgage credit.[1] The US mortgage market is also subject to heavy government involvement through various federal agencies, including the housing government-sponsored enterprises (GSEs). In the decades preceding the 2007/08 crisis, the various agencies collectively accumulated a large share of the total outstanding US mortgage debt on their balance sheets. In this paper, we investigate whether agency portfolio purchases of mortgage assets influence the availability and cost of housing credit, and whether there are spillovers to other debt markets and economic activity more broadly.

While the history of agency activity offers a rich source of variation to study the effects of government asset purchases, it also presents a number of challenges. The largest agencies, Fannie Mae and Freddie Mac, have been privately owned for much of their existence and therefore carry responsibilities to stock owners as well as to their public missions of providing "stability" and "ongoing assistance" in mortgage markets. Both profit and public objectives cause these agencies to systematically and rapidly respond to market conditions, such that changes in their mortgage purchasing activity reflect changes in housing credit demand and many other influences. Some of the correlation between agency

[1] See e.g. Mian and Sufi (2009), Justiniano, Primiceri, and Tambalotti (2014), or Di Maggio and Kermani (2016).

balance sheets on the one hand and credit growth or mortgage rates on the other is therefore likely to reflect reverse causality.

Our strategy to isolate changes in agency purchasing activity free of confounding influences is to focus on historical credit policy interventions affecting agency mortgage holdings, in the spirit of the approaches in Romer and Romer (1989, 2010) and Ramey (2011) to studying monetary and fiscal policy. Based on a narrative analysis of the regulatory history of the housing agencies, we identify and quantify significant policy events affecting agency purchases. These include adjustments to capital requirements, portfolio caps, or statutory borrowing authority, direct appropriations and capital injections by the Treasury, or changes to the pool of mortgages eligible for agency purchase, such as changes in conforming loan limits or authorizations to enter new mortgage market segments.

Credit policy changes are often reactions to cyclical conditions in mortgage and housing markets, the recent crisis being a prime example. However, many interventions are motivated by other longer-run objectives such as increasing homeownership. Based on an extensive analysis of historical sources, we classify each significant credit policy change as motivated by either cyclical considerations or by other non-cyclical objectives.[2] This results in a measure summarizing the non-cyclically motivated policy events, which we use as an instrumental variable in regressions of a variety of outcome variables on measures of agency purchasing activity. Similar to the approach in Ramey and Zubairy (2017) to estimating government spending multipliers, we estimate the cumulative effects of an increase in agency purchases on mortgage credit and origi-

[2]The full narrative analysis is in a companion background paper, Fieldhouse and Mertens (2017), available at http://www.nber.org/papers/w23165.

nations, as well as impulse responses to news shocks about future agency purchasing activity.

It is not clear ex ante that government purchases of mortgage assets have meaningful effects on the cost and availability of housing credit. If financial market frictions are relatively unimportant, an increase in agency purchases may have little impact on the volume of mortgage credit, and simply lead to crowding out of private holdings. If such frictions are instead pervasive, mortgage market policies may, on the other hand, be very important for the provision of credit to residential borrowers. Based on our methodology, we find that agency purchases indeed lead to statistically significant expansions in mortgage credit. Our estimates indicate that each additional dollar in agency mortgage purchases leads to a 3 to 4 dollar cumulative increase in mortgage originations over the course of three to four years, and a net expansion in the stock of mortgage debt of around one dollar. The rise in originations is largely driven by an increase in refinancing activity, but is also followed by a greater volume of originations financing home purchases. The expansionary effects on housing credit are accompanied by temporary reductions in mortgage interest rates, which fall by 10 to 15 basis points for more than a year following an increase in agency purchases of one percent of trend originations.

Agency purchases also affect prices in other asset markets. We estimate that the 10-year Treasury rate and the 3-month T-bill rate both decline when the agencies increase their purchases of mortgages. Key policy objectives behind the housing credit policies first introduced in the 1930s included boosting the availability of housing credit, increasing residential investment, and elevating homeownership over the long run, all recurrent motivations for subsequent pol-

icy interventions. We find evidence that supports these roles of the agencies in that new housing starts and homeownership rates rise following an increase in agency mortgage purchases. We also find some evidence that agency mortgage purchases increase house prices and stimulate private sector consumption. There is no clear evidence of any significant impact on the unemployment rate or personal income.

Perhaps our most surprising finding concerns the relationship between housing credit and monetary policies. We show that the narratively identified housing credit policy shocks have forecasting power for the residual shock component of the Romer and Romer (2004) decomposition of federal funds rate target changes, while the reverse is not true. Instead, we find that cyclically motivated housing credit policy changes lean against the wind of contractionary monetary disturbances. Housing credit policy shocks have larger effects on refinancing originations than interest rate shocks, and influence homeownership independent of short-term interest rates. The quantitative effects of housing credit policy and conventional monetary shocks are very similar along many other dimensions. These findings suggest that both may share similar transmission channels, and that the interplay between monetary and credit policy deserves more attention.

In the appendix, we also pursue an alternative identification strategy based on instrumenting agency purchases with shocks to Fannie and Freddie excess stock market returns. This approach is analogous to Fisher and Peters (2010), who use excess return innovations in major US defense stocks as a measure of news shocks to military spending. The results validate the findings obtained from the narrative approach.

1.2 Mortgage Purchases as Credit Policy in the United States

The US government intervenes in the mortgage market in many ways. We focus attention on the federal involvement in purchasing residential mortgages. The first significant use of this type of policy dates back to the Great Depression. The sharp and sustained downturn in credit markets motivated Congress to create the Home Owners' Loan Corporation in 1933. Financed by bonds, the Corporation purchased delinquent mortgages from lenders and refinanced these mortgages into fully amortizing fixed-rate loans with long maturities to lower monthly payments for distressed mortgagors. In 1938, Congress created Fannie Mae to support a secondary market for government-guaranteed mortgages. Fannie's authority to acquire mortgage debt was increased greatly after WWII to support the construction sector and promote homeownership among veterans. The late 1960s saw the creation of Ginnie Mae to provide continued support for the market for government-guaranteed mortgages. In 1970, Fannie Mae obtained permission to enter the conventional market, i.e. the market for loans not directly guaranteed or insured by the government, and the newly created Freddie Mac joined Fannie Mae in developing a nationwide secondary market for conventional mortgages.

Over time, the agencies have played an increasingly active role. The two largest GSEs, Fannie and Freddie, acquire mortgages through advance commitments to buy loans from mortgage lenders, which are delivered once the loans are originated in the primary market [3] Until the late 1960s, the purchases by Fannie were financed predominantly by borrowing from the Treasury. After-

[3] Another major housing GSE is the Federal Home Loan Bank System, chartered during the Depression to provide wholesale liquidity to member mortgage lending institutions. We use the term 'GSE' to refer to Fannie and Freddie.

wards, as quasi-private entities, Fannie and Freddie have financed these purchases with a mix of private capital and debt issued in capital markets. A third financing option is the issuance of mortgage pools, i.e. mortgage-backed securities (MBS). Securitization was brought to the conventional market by Freddie Mac in the early 1970s, and took off in the 1980s when Fannie Mae entered the business. Mortgage securitization has consistently been GSE-dominated, perhaps with the brief exception of the 2004-2006 private-label securitization boom. In the process of packaging whole mortgages into securities, the agencies also assume the credit risk in return for guarantee fees. From the early 1990s onwards, the agencies increasingly retained their own and acquired each other's MBS, as opposed to selling them to private investors.

Figure 1.1 illustrates the evolution of agency involvement in the residential mortgage market over time. The upper left panel shows the stock of total residential mortgage debt both as a ratio of GDP and as ratio of total residential wealth. The upper right panel shows the total annualized volume of residential mortgage originations as a ratio of GDP and as a fraction of outstanding mortgage debt. The lower panels of Figure 1.1 provide measures of agency market shares, constructed by consolidating data on holdings and net purchases of whole loans and MBS as reported on the agencies' balance sheet and activity statements. The left panel shows the fraction of mortgage debt owned by Fannie, Freddie, and Ginnie as well as all other federal agencies with mortgage holdings, such as the Federal Home Loan Banks and the Federal Reserve.[4] The lower right panel show the flows of net mortgage purchases by the agencies as a

[4]Other agencies include the Home Owners' Loan Corporation, Treasury, Veterans Administration, Federal Housing Administration, Federal Farmers Home Administration, Resolution Trust Corporation, Federal Deposit Insurance Corporation, and Public Housing Administration. We do not include mortgages in government pension funds. See the data appendix III for sources.

percentage of total originations. The blue line shows the net portfolio purchases. To distinguish these portfolio purchases clearly from those for securitization, the figure also shows in red the combined issuance of MBS by the agencies.[5]

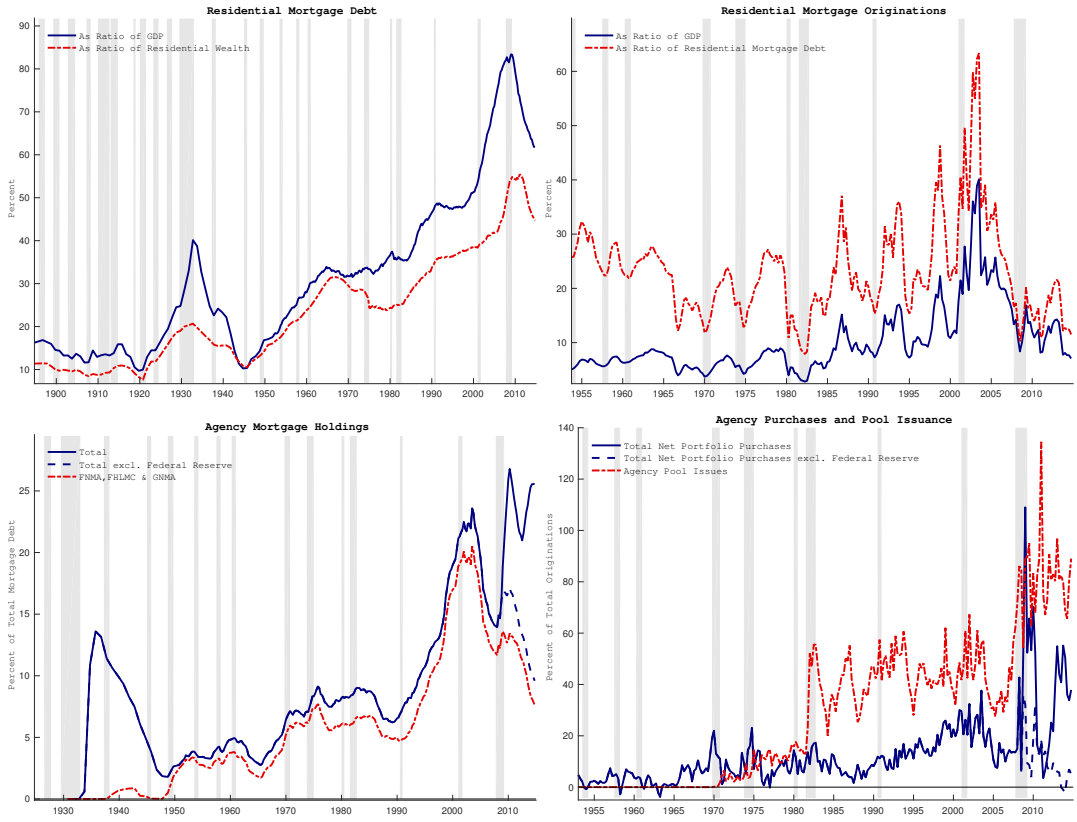

Figure 1.1: Mortgage Debt, Annualized Originations, and Agency Market Shares

Notes: Residential mortgage debt and originations include home as well as multifamily mortgages. Agency holdings include holdings of both whole loans and pools. Agency purchases are net purchases for portfolio investment, whereas pool issuance approximate purchases backing new mortgage pools (mortgage-backed securities). The grey bars are NBER-dated recessions. Sources: see data appendix.

The post-WWII period witnessed a marked expansion in mortgage debt, rising from around 10 percent of GDP at the end of WWII to more than 80 percent by 2008, before steadily declining in the wake of the 2007/08 financial crisis. Originations of new mortgages are volatile, procyclical, and average around 20

[5]Because purchases may include loans originated in prior periods, the market shares may occasionally exceed 100 percent.

percent of outstanding debt at an annualized rate.[6] By any measure, the government agencies have over time become large players in the mortgage market. Between 1980 and 2006, total purchases in the secondary market by Fannie and Freddie alone average around 40 to 50 percent of originations. The majority of these acquisitions were packaged in MBS and sold off to private investors. The portfolio purchases, comprising whole loans retained for the portfolio as well as net acquisitions of MBS, have averaged 7 percent of originations between 1967 and 1990, and about 15 percent between 1990 and 2006. At the peak in 2004, almost a quarter of all residential mortgage debt resided on the balance sheet of a federal agency, with roughly 20 percent owned by Fannie and Freddie alone. In early September 2008, Fannie and Freddie were taken into conservatorship and were required to gradually wind-down their balance sheets by two-thirds. The Federal Reserve subsequently pursued several rounds of large-scale purchases of agency MBS under its quantitative easing (QE) programs, and its current holdings amount to roughly 15 percent of total mortgage debt outstanding. For readers wishing more information about the institutional history of the housing agencies, appendix I provides more background.

The focus of this paper is on the portfolio purchases of the housing agencies, shown in blue in the lower right panel in Figure 1.1. Prior to the Fed's QE programs, Fannie and Freddie accounted for the bulk of agency mortgage acquisitions. Even as privately owned corporations, Fannie and Freddie have been key agents of federal housing policy and differ from traditional financial intermediaries in a number of important ways. First, they have always maintained authorization to borrow from the Treasury. While this authorization was

[6]Net additions to the stock of mortgage debt are considerably smaller than originations since both existing home sales as well as refinancing transactions typically lead to minor net changes in mortgage debt.

limited and never formally exercised, it sufficed to create the widely held belief that the US government would never allow a GSE to default. This perception, eventually justified by the government takeover of Fannie and Freddie in 2008, meant that interest rates on agency bonds have typically been close to Treasury rates. Second, agency debt is eligible for open market operations by the Fed. In the 1960s and 1970s the Fed made significant purchases of agency debt, see Haltom and Sharp (2014), and again so under the QE programs. Third, the prudential supervision of the GSEs is separate from private banks and, prior to 2008, resided within the Department of Housing and Urban Development (HUD).[7] Regulatory oversight of the GSEs was traditionally light compared to that of private banks, and the GSEs generally enjoyed much less stringent capital and reporting requirements. For instance, despite being publicly listed companies, Fannie and Freddie were exempt from filing with the Securities and Exchange Commission until the early 2000s. Finally, for much of their existence, the GSEs have also benefitted from various preferential tax treatments.

In exchange for the privileges granted by federal law, the GSEs face a number of restrictions and obligations. Fannie and Freddie cannot originate loans in the primary market and are not allowed to diversify portfolio holdings much beyond mortgage assets. Their purchases are limited to conforming mortgages that must meet certain underwriting standards, and the principal on the loans cannot exceed a maximum amount, known as the conforming loan limit. The authority for adjusting the limit and other loan characteristics that determine what mortgages are conforming has generally lied with Congress and the HUD Secretary. In 1980, the conforming loan limit became indexed to a house price index maintained by Freddie Mac. Since then typically around 80 percent of

[7]Since 2008, the regulatory authority has lied with the Federal Housing Finance Agency, an independent federal agency.

mortgages have been conforming.[8] Finally, the GSEs are expected to balance stock owner interests with certain public policy objectives, including the stabilization and enhancement of mortgage markets, as well as assistance with the provision of credit to lower-income households.

1.3 Related Literature

There are relatively few attempts at identifying the dynamic effects of agency purchases on mortgage credit, residential investment, or homeownership. An early literature estimates reduced form models of credit and housing markets to assess the impact of GSE activity in the 1970s, e.g. Arcelus and Meltzer (1973), Meltzer (1974), Hendershott and Villani (1977, 1980), Jaffee and Rosen (1978), and Kaufman (1985). Although no clear consensus emerges from this early work, Smith, Rosen, and Fallis (1988) conclude that an additional dollar in government lending increases mortgage debt by 25 to 35 cents after three to four quarters. Arcelus and Meltzer (1973) and Meltzer (1974), however, argue there is no effect on residential investment or home purchases, while Jaffee and Rosen (1978) and Hendershott and Villani (1977, 1980) find a positive impact of agency activity on home construction.

Starting with Hendershott and Shilling (1989), a number of studies document significant interest rate spreads between conforming and jumbo loans, which suggests that the GSEs affect the cost of mortgage credit. Hendershott and Shilling (1989) attribute this result to a credit supply channel operating

[8] In response to the financial crisis, the limit was increased substantially for the financing of homes in urban areas, which further expanded the pool of mortgage debt eligible for GSE purchase.

through agency securitization. A number of studies investigate the time series relationship between GSE activity and credit costs. Naranjo and Toevs (2002), for instance, find a negative long-run relationship between GSE purchases and mortgage rates, while González-Rivera (2001) finds only a negative short-run relationship.[9] Lehnert, Passmore, and Sherlund (2008) study the impact of GSE activities on primary and secondary market mortgage spreads using both generalized impulse response analysis and causal orderings in VAR models. Based on monthly data from 1993 to 2005, these authors find little evidence that higher GSE purchases impact mortgage spreads, which is consistent with the Meltzer view that credit market interventions are neutral. In a May 2005 speech, Federal Reserve Chairman Alan Greenspan conveyed a similar view of the role of the GSEs' portfolio activities, stating that "*Fannie's and Freddie's purchases... with their market-subsidized debt do not contribute usefully to mortgage market liquidity, to the enhancement of capital markets in the United States, or to the lowering of mortgage rates for homeowners*" (Greenspan , 2005).

In this paper, we contribute new evidence against the Greenspan-Meltzer view that agency mortgage purchase have little effect on the cost and availability of mortgage credit. Our approach is similar in spirit to Lehnert et al. (2008), but adopts novel and arguably better identification strategies to control for the endogeneity of agency purchases. We also study a much longer time frame than any of the earlier papers, and we estimate the effects on both credit aggregates and mortgage rates. Moreover, our analysis allows us to study the

[9]Naranjo and Toevs (2002), who use vector error-correction (VEC) and GARCH (generalized autoregressive conditional heteroskedastic) models and study monthly time series data from 1986 to 1998, find that both GSE purchases and securitization reduce conforming mortgage spreads and volatility, while documenting some spill over to reductions in non-conforming loans, which they attribute to investor substitution effects. González-Rivera (2001), who uses VEC models and monthly data from 1994 to 1999, finds a negative short-run relationship of GSE purchases responding to widening secondary mortgage market spreads, and some evidence of a pass through from secondary to primary mortgage rates from agency purchases.

dynamic causal impact on many other variables of interest, including housing starts, home prices, homeownership rates, cyclical indicators, and various other interest rates and credit spreads.

Our paper is related to the many analyses of the large-scale MBS purchases by the Federal Reserve under the QE programs. To isolate the effects of these purchases, the literature typically restricts attention to high frequency financial data, and most studies conclude that the MBS purchases lowered secondary market mortgage yields on impact, see e.g. Gagnon et al. (2011), Krishnamurthy and Vissing-Jørgensen (2011), Patrabansh, Doerner, and Asin (2014), and Hancock and Passmore (2011, 2015).[10] Exploiting cross-sectional variation, a few recent studies also uncover evidence that is suggestive of a positive impact on mortgage lending. Di Maggio, Kermani, and Palmer (2016), for instance, find that, after the first QE intervention, originations of mortgages qualifying for inclusion in securities eligible for purchase by the Fed increased substantially more than those of non-qualifying mortgages. No such differential effects are evident after the second QE intervention, which did not include MBS purchases. Rodnyansky and Darmouni (2018) find that banks with larger mortgage positions increased lending relative to banks with smaller positions, and Chakraborty, Goldstein, and MacKinlay (2017) show that banks with MBS exposure increased their mortgage origination share relative to other banks. By studying a longer history of housing credit policy interventions, we are able to circumvent some key limitations of the event studies of the Fed's large-scale MBS purchases. Our approach permits an analysis beyond the very short-run response of financial variables, and unlike the cross-sectional studies, provides direct evidence on aggregate rather than relative effects.

[10] Stroebel and Taylor (2012) instead find no effects of the MBS purchases under QE1.

Our study also fits in a broader empirical literature that aims to identify credit supply shocks and estimate their aggregate effects. Peek, Rosengren, and Tootell (2003), for instance, use bank health indicators as proxies for loan supply shocks and find substantial effects on inventory investment and other aggregates. Gilchrist and Zakrajšek (2012) look at innovations in corporate bond spreads after removing cyclical default premia, and demonstrate their strong predictive content for macroeconomic fluctuations. Bassett, Chosak, Driscoll, and Zakrajsek (2014) study residual variation in survey measures of bank lending standards and find an impact on economic activity. Mian, Sufi and Verner (2017) use variation in the timing of bank branching deregulation in the 1980s to construct differential state-level credit supply shocks, and find that these shocks impact household borrowing and employment. Our narrative policy indicator and the GSE excess return shocks discussed in the appendix can similarly be viewed as proxies for credit supply shocks in the mortgage market.

Many existing theories of financial frictions can explain the non-neutrality of agency mortgage purchases. Krishnamurthy and Vissing-Jørgensen (2011) and Di Maggio et al. (2016), among others, discuss a variety of potential transmission channels associated with the MBS purchases under the QE programs. Many of these channels have similar implications for mortgage purchases by the GSEs. Through the portfolio rebalancing channel, for instance, private investors bid up the price of mortgages when rebalancing assets towards some desired composition of mortgages and agency liabilities. GSE portfolio purchases are not funded with reserves, but with debt instruments that closely substitute for Treasuries in terms of liquidity and (perceived) safety.[11] Depending on the level of segmentation in financial markets, rebalancing effects may spill over to other

[11] This difference may be less important if the Federal Reserve simultaneously acquires agency debt.

asset markets, in which case yields on mortgage substitutes—particularly other types of long-term debt—may fall as well.

Agency mortgage purchases also matter when private mortgage lenders face capital constraints because of regulations or binding incentive constraints, for instance as in the theoretical models of Gertler and Kiyotaki (2010) or Cúrdia and Woodford (2011). Because the GSEs are more highly leveraged than private lenders, aggregate lending capacity increases with agency market share. Agency purchases that drive up the price of mortgages may additionally improve the net worth position of private mortgage lenders, while the exchange of mortgages for agency debt lowers their risk-weighted leverage ratios. Increased agency activity in the secondary mortgage market may also reduce liquidity premia. Our findings support a role for credit supply channels in determining household debt, homeownership, and residential investment, but it is beyond the scope of this paper to isolate precisely which of these channels may be more important.

1.4 Identifying Causal Effects of Agency Mortgage Purchases

1.4.1 Endogeneity Problems

To assess the impact of agency portfolio purchases, one might be tempted to simply correlate measures of agency activity, such as those in Figure 1.1, with credit and other macroeconomic aggregates. This would, however, ignore various endogeneity problems. For one, the agencies respond to changes in market conditions. To maintain market share, for instance, the GSEs vary purchases

with the supply of mortgages into the secondary market, which in turn depends on fluctuations in the housing market and the economy. The agency response to varying growth in the mortgage market induces a positive relationship between agency balance sheets and overall mortgage lending activity. Failure to correct for this source of reverse causality is likely to lead to an overestimation of the impact of agency activity on credit availability.

A different endogeneity concern operating in the opposite direction is that agency purchases typically expand relative to the mortgage market when credit is tight and/or conditions in the housing market are deteriorating. This was evidently the case during the latest financial crisis through the actions of the Fed and Treasury, but is also true of earlier episodes. To illustrate this, Figure 1.2 shows the average real levels of agency and private holdings of mortgage debt over the course of business and credit cycles since the mid-1950s. The left panel of Figure 1.2 shows the average real levels of agency and privately held mortgage debt centered around NBER business cycle peaks. On average, growth in agency holdings is high relative to growth in private holdings prior to a business cycle peak. The growth in private mortgage holdings slows down just prior to the peak and remains low for a prolonged period after the start of a recession. The pace of growth of agency holdings, in contrast, remains roughly unchanged for at least two years after the beginning of an economic downturn.

The right panel of Figure 1.2 shows the average real levels of mortgage holdings centered around the peak of credit cycles, defined as the quarter preceding the start of credit crisis episodes based on the datings in Eckstein and Sinai (1986) and subsequent updates.[12] Agency and private holdings grow at roughly

[12]The dating of pre-1986 credit crunches is from Eckstein and Sinai (1986). The dating of post-1986 crunches is based on Owens and Schreft (1993) for the 1990 commercial real estate crunch, Lehnert, Passmore, and Sherlund (2008) for the 1998 Russian default/LTCM crisis, and Bordo

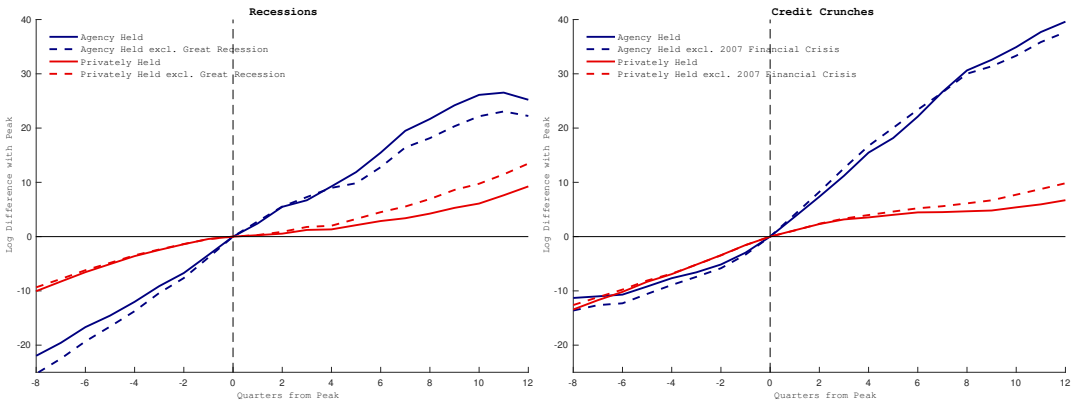

Figure 1.2: Real Mortgage Debt by Holder in Recessions and Credit Crunches

Notes: Mortgage debt is deflated by the core PCE price index. The left panel shows the average of 9 NBER recessions starting 1957Q2, 1960Q1, 1969Q4, 1973Q4, 1980Q1, 1981Q3, 1990Q3, 2001Q1, 2007Q4. The right panel shows the average of credit crunches beginning one quarter after the following dates: 1955Q3, 1959Q1, 1965Q4, 1968Q4, 1972Q4, 1978Q1, 1980Q4, 1990Q1, 1998Q2, 2007Q2. See data appendix for sources.

similar rates prior to a credit crunch. Growth in private holdings of mortgage debt slows markedly following the start of a credit crisis. In contrast, growth in agency holdings accelerates at the onset of a credit crunch and remains elevated for about ten quarters, before flattening toward the pre-crunch trend.

The evidence thus indicates that agencies tend to increase their share of the market in cyclical downturns and credit crunches. These countercyclical purchase dynamics are robust to omitting the 2007/08 crisis and the Federal Reserve's interventions. There are a number of reasons why the agencies maintain or expand purchases during cyclical downturns. A public mission to provide stability to mortgage markets is mandated in the GSEs' statutory charters. Credit crises also offer particularly profitable opportunities for the GSEs because their lending spreads widen relative to private intermediaries, due to countercyclical mortgage spreads and the implicit guarantee provided by the US government. Finally, the federal government often undertakes deliberate regula-

and Haubrich (2010) for the 2007/08 financial crisis.

tory or legislative actions to further enable agency expansions during downturns. The fact that agency purchases tend to accelerate when mortgage spreads are elevated and/or credit is tight induces a negative relationship with mortgage credit aggregates. Failure to account for this negative association is likely lead to an underestimation of the causal effects of agency mortgage purchases.

1.4.2 Narrative Analysis of Policy Changes Affecting Agency Mortgage Holdings

Our strategy to control for reverse causality in the relationship between agency mortgage purchases and credit conditions is to use a narrative identification approach involving major regulatory events impacting agency mortgage holdings. By focusing on policy interventions by the federal government, we exclude variation in purchase activity resulting from the agencies' regular response to market developments. Because policymakers themselves often respond to conditions in mortgage and housing markets, we exclude interventions with short-run stabilization motives as the primary objective. The end result of our narrative analysis is a record of housing credit policy events that we use as an instrument for agency purchase activity. Here, we summarize the methodology of the narrative analysis, and describe the resulting policy indicators. A companion background paper, Fieldhouse and Mertens (2017), provides the full narrative analysis of credit policy events, including explanations of relevant findings for each policy event and extensive documentation that allows verification of our analysis.

The development of the narrative instrumental variable follows five steps:

identifying significant policy changes affecting agency portfolios; quantifying their ex ante projected impact on agency holdings; pinpointing the timing of when the policies became publicly known; classifying each policy change as either cyclically or non-cyclically motivated; and restricting the sample for consistent use as an instrument for agency purchasing activity. Next, we describe the procedures used in each of these steps. Table 1.1 provides an overview of the historical primary sources used in the narrative analysis.

Table 1.1: Sources for Narrative Analysis

Government Publications	
Board of Governors	Annual Report, Press releases, *Federal Reserve Bulletin*
Congressional Budget Office	*The Housing Finance System and Federal Policy: Recent Changes and Options for the Future* (1983), *Controlling Risks of Government-Sponsored Enterprises* (1991)
Congressional Quarterly	*Congressional Quarterly Almanac*
Congressional Research Service	*A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003* (2004), *The Conforming Loan Limit* (2008)
Council of Economic Advisors	*Economic Report of the President*
Department of Housing and Urban Development	HUD news releases, *The Secondary Market in Residential Mortgages* (1982), *1986 Report to Congress on the Federal National Mortgage Association* (1987), *The National Homeownership Strategy: Partners in the American Dream* (1995), *Privatization of Fannie Mae and Freddie Mac: Desirability and Feasibility* (1996), *Profiles of GSE Mortgage Purchases in 2001-2004* (2008)
Department of the Treasury	Press releases and statements, *Report of the Secretary of the Treasury on Government-Sponsored Enterprises* (1990), *Government Sponsorship of the FNMA and the FHLMC* (1996)
Federal Home Loan Mortgage Corp.	Press releases and statements, Annual Report, Form 10-K
Federal Housing Finance Administration	Press releases and statements, *Mortgage Market Notes*
Federal National Mortgage Association	Press releases and statements, Annual Report, Form 10-K, *Monthly Volume Summary*, *Information Statement*, *MBSenger*, *Offering Circular*, *Background and History of the Federal National Mortgage Association* (1969, 1973)
Financial Crisis Inquiry Commission	*Final Report of the Financial Crisis Inquiry Commission* (2011)

Government Accountability Office	*The Federal National Mortgage Association in a Changing Environment* (1985), *GSEs: A Framework for Limiting the Government's Exposure to Risk* (1991), *Housing Enterprises: Potential Impacts of Severing Government Sponsorship* (1996), *HUD's Mission Oversight Needs to be Strengthened* (1998)
US Congress	Hearing transcripts and reports: Committees on Appropriations, Committees on Banking and Currency, Committee on Banking, Finance and Urban Affairs, and Committee on Banking, Housing and Urban Affairs
Office of Federal Housing Enterprise Oversight	Press releases and statements, Annual Report, *Mortgage Market Notes*, *Mortgage Markets and the Enterprises*, *Evaluating the Capital Adequacy of Freddie Mac and Fannie Mae* (1998), *Special Examination Reports* (2003, 2004, 2006)
Office of the Federal Register	*Federal Register*
Office of Management and Budget	*Budget of the United States Government*
The President's Commission on Housing	*The Report of The President's Commission on Housing* (1982)
Press and Online Sources	*ABA Banking Journal*, *American Banker*, *The American Presidency Project*, *The Bond Buyer*, *Dow Jones Capital Market Reports*, *Dow Jones News Service*, *Dow Jones Newswires*, *Financial Times*, *MarketWatch*, *National Mortgage News*, *The New York Times*, *Reuters News*, *The Wall Street Journal*, *The Washington Post*
Overview Books and Articles	
Bartke	*Fannie Mae and the Secondary Mortgage Market* (1971), *Home Financing at a Crossroads: A Study of the Federal Home Loan Mortgage Corporation* (1973)
Elliot, Feldberg, and Lehnert	*The History of Cyclical Macroprudential Policy in the US* (2013)
Greenspan	*The Age of Turbulence: Adventures in a New World* (2007)
Haar	*Federal Credit and Private Housing: The Mass Financing Dilemma* (1960)
Hagerty	*The Fateful History of Fannie Mae: New Deal Birth to Mortgage Crisis Fall* (2012)
Hoffman and Cassell	*Mission Expansion in the Federal Home Loan Bank System* (2010)
Hunter	*The FNMA: Its Response to Critical Financing Requirements of Housing* (1971)
McLean	*Shaky Ground: The Strange Saga of the US Mortgage Giants* (2015)

Notes: For detailed bibliographical references, see Fieldhouse and Mertens (2017).

1. Identifying Significant Policy Changes. Policy changes affecting agency purchases and mortgages holdings have historically been directed by a range of policymakers, notably Congress, the President and the Cabinet, particularly the Secretaries of the Treasury and HUD, various regulatory agencies in the executive branch, and the Federal Reserve. The relevant regulatory institutions were disbanded and reinvented several times over the decades, and as a result there is no single consistent source tracking the history of housing credit policy. Instead, a wide range of sources is required for identifying and analyzing policy changes.

Policy actions generally originate from one of three sources: enacted legislative changes, regulatory policy changes published in the Federal Register or as other binding agreements with regulators, and macroeconomic stabilization policies managed by the Federal Reserve or Treasury. We restrict attention to significant policy actions, meaning actions that would either be expected to directly impact agencies' permissible volume of net purchases and retained portfolio holdings, or else considerably expand the pool of eligible mortgages an agency was authorized or required to purchase. Interventions determined at the legislative level include adjusting statutory leverage ratios, capital requirements, and conforming loan limits, provision of working capital, mandatory retirements of public stock, and direct appropriations or borrowing authority for purchases, among others. Regulatory policy actions include setting permissible debt-to-capital ratios, imposing capital surcharges in excess of statutory capital requirements, capping portfolio size or growth, setting affordable housing goals, and authorizing entrance to new segments of the mortgage market. Macroeconomic stabilization actions include the Fannie and Freddie conservatorship agreements entered in September 2008, subsequent amendments

to these agreements, and the large-scale MBS purchase programs conducted by the Federal Reserve and Treasury since 2008.

We use the comprehensive Congressional Research Service report "*A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003"* (CRS , 2004) as a starting point for identifying significant policy changes, particularly pertinent public laws. This legislative history is cross-referenced with the *Congressional Quarterly Almanac*'s Housing and Development tracker. We additionally search appendices of the *Budget of the United States Government* for information about policy changes affecting Ginnie Mae during relevant years, cross-referenced with HUD appropriations bills and related reports of the House and Senate Appropriations Committees. After identifying public laws affecting the agencies, we use the ProQuest Congressional Publications Database to collect the legislative text of those enacted laws, related committee reports and Congressional hearing transcripts, and any preceding House and Senate versions of the final bill.[13] We then analyze relevant sections of these primary sources to confirm these laws' material impact on mortgage holdings and better understand the nature of the policy changes.

Legislative actions often set in motion the drafting of new regulatory rules. Identified significant legislative events are the starting point for a directed search of related regulatory changes in HeinOnline's Federal Register Library. We also obtain information from the GSEs' annual reports about significant regulatory changes, as well as from 10-K filings in more recent years. We addition-

[13]The ProQuest Congressional Publications Database provides a comprehensive compilation of all public laws, committee reports, and hearings. Public laws and related legislative actions since 1973 are available from Congress.gov, a project of the Library of Congress, along with committee reports since 1995. Most older public laws are available through LegisWorks Statutes at Large Project. Most hearing transcripts are digitally available since 1985 from the US Government Publishing Office.

ally use sections of the *Economic Report of the President* and *Annual Report of the Board of Governors of the Federal Reserve*, as well as the various reports by regulators to collect information about regulatory rulings. We use newspapers, financial newswires, and mortgage industry newsletters to help direct the search for information about the rulings in the Federal Register, particularly the *Wall Street Journal*, *American Banker*, and *National Mortgage News*.[14] Final rules published in the Federal Register almost always include a detailed background and overview of the initial proposed rule, public comments received, and any subsequent modifications.

Using these procedures, we are confident that we have identified the overwhelming majority of significant policy events. The main concern is developing a policy indicator that is correlated with underlying regulatory shocks to agency purchasing activity. The larger the number of significant policy events identified, the higher the relevance of the instrument.

2. Quantification. To be included, we require that primary sources either explicitly cite projections of the policy change's impact, or contain information that can be used to quantify the impact on agency mortgage holdings. For each policy change, we use contemporaneous sources to obtain an ex ante estimate of the projected impact on the agencies' capacity to purchase mortgages, measured in annualized billions of dollars within the first year of taking effect. If a baseline is needed for quantifying a policy change, say for Fannie's regulatory capital when its debt-to-capital ratio is increased, we use the most recent data publicly available prior to the policy change. We use ex ante balance sheet data on reg-

[14]This is done by Factiva and LexisNexis Academic searches of key words related to the regulatory policy change, in search windows around the vicinity of the event. After roughly pinpointing the publication date of a rule, we search the Federal Register for the rule itself, and then work backwards to initial rulings.

ulatory capital, liabilities, and/or assets in conjunction with standing leverage or capitalization requirements to estimate the impact of related changes, such as increases in permissible leverage ratios. Similarly, public capital injections are quantified as a multiple of one more than the prevailing leverage ratio, to capture the potential increase in assets supported by related debt issues plus the working capital itself. Direct appropriations are straightforward to quantify, at most requiring a pro-rata annualization adjustment based on relevant implementation lags. To quantify potential impacts of discretionary conforming loan limit changes, we rely on estimates from Congressional committee reports accompanying legislation. Such reports typically cite the extent to which a large conforming loan limit increase would restore a GSE's real purchase activity. We quantify the impact of such adjustments as the difference between annualized purchase volumes immediately preceding the policy change and the home price index-adjusted purchase volume of the benchmark year being restored. For relatively large, open-ended changes, such as leverage ratio increases, potential effects on mortgage holdings are annualized using a two-year rule, which assumes half of the full potential impact would be realized within the first year of taking effect.

For other policies that are inherently harder to quantify, such as authorizations for program expansions into new mortgage market segments, we search for ex ante estimates of projected impacts on purchasing activity from committee reports, market analysts, regulators, or agency executives. We do not include policies that would not have been expected to impose or alleviate binding constraints on agency activity. For instance, when adjustments to leverage ratios or affordable housing goals are viewed as non-binding by most accounts and this appears consistent with the agencies' balance sheet and purchase behavior, we

do not consider the policy change significant. We also exclude any laws or regulations that merely extend prior authorizations, and for certain authorizations affecting Ginnie Mae, we use a current policy baseline as opposed to a current law baseline for scoring annual funding changes.

When estimating the quantitative aspects of the policies, we rely on information released by the Congressional Budget Office, Government Accountability Office, Treasury Department, and Congressional Research Service that contain detailed analyses of policy changes, background information, and/or balance sheet data for the agencies in question, see Table 1.1. We also use information from the annual or periodic reports of the agencies and regulators, particularly regarding balance sheet data, and from appropriations bills and budget appendices for certain policies affecting Ginnie Mae. Committee report language occasionally cites projected effects of a pending policy change, and we also use the financial press and industry newsletters to search for projections of the impact of policies that are difficult to quantify.

3. Timing. At the operational level, the agencies sell commitments to purchase conforming mortgages from primary market lenders, which may then be exercised by the mortgagee up to an expiration date. Consequently, actual agency purchases tend to lag behind the issuance of commitments to purchase mortgages from primary market originators. Together with the usual policy implementation lags, the policy events are therefore best thought of as news shocks about agency mortgage purchases. We date each policy intervention to the month in which we estimate that it became publicly anticipated, rather than the month in which it was formally announced or took effect.

The ProQuest Congressional Publications Database, HeinOnline's Federal

Register Library, the *CQ Almanac*, and financial press are the primary sources used for documenting pertinent news surrounding policy changes and the implementation dates. For regulatory changes, we use the month in which proposed rules were first published in the Federal Register or reported in the press. We date legislative changes to when the provision including the policy change was agreed upon in the House, Senate, or conference version of a bill, rather than upon subsequent enactment. For Fannie and Freddie, we additionally check the timing by cross-referencing policy announcements with GSE stock price movements and the financial press, as often policy news is priced into GSE shares.

4. Classification by Motivation. The classification of the policy events distinguishes between interventions that are guided by prevailing business cycle and financial conditions, and those that are plausibly free of such contemporaneous influences. Our instrument for agency mortgage purchases only includes the latter to avoid bias due to the systematic relaxation of policies during periods of stress in mortgage or housing markets. The classification is based on identifying the primary motivations underlying each of the policy interventions. To make this classification, we parse historical documents, paying particular attention to the rationales invoked by policymakers and the press, the nature of the legislative vehicles or regulatory processes, the relation to known periods of economic and financial stress, and the time horizon of policy objectives.

The principal data sources for identifying policy motives include Congressional committee reports and hearings, Presidential speeches and signing statements, the *Budget of the US Government*, *Economic Report of the President*, *Federal Reserve Bulletin*, *Annual Report of the Board of Governors of the Federal Reserve*, *CQ*

Almanac, and the financial press (see Table 1.1). For legislated policies, the accompanying reports of the Senate Committee on Banking, Housing and Urban Affairs and the House Financial Services Committee typically detail congressional intent and any pertinent economic context. Major housing policy laws are also usually accompanied by a Presidential signing statement explaining the bill's motivation, context, and intended impact. Budget appendices and/or committee reports accompanying appropriations bills usually explain the impetus for certain policy changes affecting Ginnie Mae. Final rules published in the Federal Register also almost always include a detailed background and history, shedding light on regulators' motives.

Based on these sources, we classify the policy changes as either cyclically motivated or non-cyclically motivated. Interventions classified as cyclically motivated tend to emphasize short-term outcomes, such as boosting housing starts in a recession. Legislative vehicles for such policy actions tend to be quickly drafted and enacted, with a relatively concise legislative history and narrow focus. Policymakers are typically quite explicit about cyclical concerns and objectives, overwhelmingly so when policies are implemented in close proximity to recessions or credit crunches. Language we search for in committee reports and signing statements as strong evidence of cyclical motivations include "*emergency, crisis, recession, credit shortage, credit crunch, housing starts, employment, construction, downturn, depressed, stimulus, boost*", etc. Policies enacted during or near a recession or credit crunch are held to a particularly high bar for being classified as non-cyclical, but are not automatically classified as cyclically motivated.

Interventions motivated by social policy, budgetary, or other more ideolog-

ical objectives are classified as unrelated to the business or financial cycle, provided the various historical sources do not at the same time indicate significant short-term economic or financial market concerns. Political rather than economic context shapes the development of these interventions, such as an administration's emphasis on expanding affordable homeownership opportunities to lower-income households, concerns regarding the structural budget deficit, or ideological hostility toward the GSEs. It is often hard to establish a single rationale for the non-cyclical actions, which can be motivated by a mix of objectives. For our purposes, however, a more precise distinction between these objectives is not essential. Language we search for as indicative of non-cyclical motivations include "*long-term, farsighted, comprehensive, low-income, affordable housing, American Dream, homeownership, budget deficit, reduce borrowing, off-budget, privatize*," etc. Legislative actions classified as non-cyclical emphasize longer-term outcomes, such as increasing homeownership rates. Legislative vehicles for such interventions tend to be slower-moving bills, particularly deliberate overhauls of housing policy with a lengthy legislative history; the National Housing Acts, Housing and Urban Development Acts, and Housing and Community Development Acts of various years tend to meet this description, being slowly crafted and negotiated between the House, Senate, and White House, and focusing on broad, long-term objectives for housing policy, such as urban revitalization or access to affordable housing for various constituencies. New regulatory rules set in motion by such bills also tend to be classified as non-cyclical, such as HUD setting new affordable housing goals for the GSEs. Occasionally, interventions are prompted by specific events that we view as unrelated to the cycle, such as the regulatory actions taken in the aftermath of accounting scandals at Fannie and Freddie in 2003-2004.

5. Sample Restrictions. Occasionally a law or public rule sets in place changes in purchase authorizations or balance sheet restrictions to take effect only multiple years after announcement. To obtain a good indicator for news about pending purchase behavior, we exclude changes with very long implementation delays and focus on interventions taking effect within nine months of their news being made public.[15] We also restrict attention to policy events after January 1967. This choice is made to select a period of relative institutional stability, as it roughly coincides with the creation of Ginnie and Freddie, the emergence of a nationwide secondary market for conventional mortgages, and the beginning of the privatized GSE era. This starting point is also in part determined by the availability of time series used in the empirical analysis. We focus exclusively on the mortgage portfolio activity of Fannie, Freddie, and Ginnie, ignoring less significant government entities for which monthly data is not easily available. We also include purchases by the Federal Reserve and Treasury in the recent financial crisis, but in most of the analysis in Sections 1.5 and 1.6 the sample is truncated at December 2006 to deliberately exclude the financial crisis and the Fannie and Freddie conservatorship period. As shown in Figure 1.1, the three housing agencies that we analyze account for the large majority of government agency mortgage holdings between 1967 and 2006.

[15]Using a maximum lag of 12 months adds only one relatively minor event in 1968 with virtually no effect on the results. Including *all* events yields an instrument that is considerably weaker for purchases at shorter horizons. In practice, a larger maximum lag additionally includes only a couple of increases in affordable housing goals announced 18 months ahead of taking effect.

1.4.3 The Narrative Measures of Policy Changes

Table 1.2 lists the policy events resulting from the narrative analysis. Each intervention is described by the agencies affected, by its annualized projected impact (in billions of US dollars), the timing (arrival of news and effective date), and motivation. The monthly sample contains 45 months with interventions in the post-1967 sample (there are 52 interventions in total but some occur within the same month). Out of these, 28 are classified as cyclically motivated, leaving 19 distinct non-cyclically motivated policy events. In the sample that excludes interventions after December 2006, there are 15 cyclically and 17 non-cyclically motivated policy events after monthly aggregation.

Table 1.2: Narrative Measures of Policy Changes

Policy Description	Agency	Impact	News	Classification
HUDA 1968: Increased Debt-to-Capital Ratio	FNMA	+$1.39 billion	Oct. 1968	Non-Cyclical
Increased Debt-to-Capital Ratio	FNMA	+$1.13 billion	Dec. 1969	Cyclical
HUDA 1969: Special Assistance	GNMA	+$0.75 billion	Dec. 1969	Cyclical
Treasury-Guaranteed Capitalization	FNMA	+$2.6 billion	Apr. 1970	Cyclical
EHFA 1970: Special Assistance	GNMA	+$0.38 billion	July 1970	Cyclical
Conforming Mortgage Program Approval	FNMA	+$0.4 billion	Nov. 1971	Non-Cyclical
FHA/VA Tandem Authorization	GNMA	+$1.5 billion	Sep. 1973	Cyclical
FHA/VA Tandem Authorization	GNMA	+$3.3 billion	Jan. 1974	Cyclical
Subsidized Mortgage Purchase Program	FHLMC	+$1.5 billion	May 1974	Cyclical
FHA/VA Tandem Authorization	GNMA	+$1.65 billion	May 1974	Cyclical
HCDA 1974: Conforming Loan Limit	FNMA	+$1.14 billion	Aug. 1974	Non-Cyclical

Policy Description	Agency	Impact	News	Classification
HCDA 1974: Conforming Loan Limit	FHLMC	+$0.46 billion	Aug. 1974	Non-Cyclical
EHPA 1974: Tandem Program	GNMA	+$3.88 billion	Oct. 1974	Cyclical
FY1976 Approps: Tandem Program	GNMA	+$2.5 billion	Oct. 1975	Cyclical
HCDA 1977: Conforming Loan Limit	FNMA	+$4.82 billion	Oct. 1977	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FHLMC	+$0.21 billion	Oct. 1977	Non-Cyclical
HCDA 1977: Tandem Program Expansion	GNMA	+$3.75 billion	Oct. 1977	Non-Cyclical
FY1979 Approps: Special Assistance	GNMA	+$1.0 billion	Sep. 1978	Non-Cyclical
HCDA 1978: Mortgagee Expansion	FHLMC	+$2.0 billion	Oct. 1978	Non-Cyclical
FY1980 Approps: Special Assistance	GNMA	+$1.0 billion	July 1979	Non-Cyclical
HCDA 1979: Conforming Loan Limit	FHLMC	+0.86 billion	Dec. 1979	Cyclical
FY1981 Approps: Special Assistance	GNMA	-$0.2 billion	Sep. 1980	Cyclical
ARM Program Approval	FHLMC	+$0.37 billion	May 1981	Cyclical
ARM Program Approval	FNMA	+$0.4 billion	June 1981	Cyclical
Second Mortgage Program Approval	FNMA	+$5.0 billion	Sep. 1981	Cyclical
FY1982 Approps: Special Assistance	GNMA	+$0.17 billion	Dec. 1981	Cyclical
Increased Debt-to-Capital Ratio	FNMA	+$6.25 billion	Dec. 1982	Non-Cyclical
FY1983 Approps: Special Assistance	GNMA	-$1.47 billion	Dec. 1982	Cyclical
FY1984 Supp. Approps: Tandem Repeal	GNMA	-$2.92 billion	Nov. 1983	Non-Cyclical
Second Mortgage Program Approval	FHLMC	+$1.0 billion	Jan. 1986	Non-Cyclical
Decreased Debt-to-Capital Ratio	FNMA	-$2.7 billion	Apr. 1987	Non-Cyclical

Policy Description	Agency	Impact	News	Classification
Public Listing: Stock Split Capitalization	FHLMC	+$1.62 billion	Nov. 1988	Non-Cyclical
FHEFSSA 1992: Capital Requirements	FNMA	-$4.25 billion	Mar. 1990	Non-Cyclical
Affordable Housing Goals of 1995	FHLMC	+$0.61 billion	Dec. 1995	Non-Cyclical
Affordable Housing Goals of 2004	FNMA	+$7.6 billion	Apr. 2004	Non-Cyclical
Affordable Housing Goals of 2004	FHLMC	+$7.6 billion	Apr. 2004	Non-Cyclical
Accounting Scandal: Capital Surcharge	FNMA	-$141.4 billion	Sep. 2004	Non-Cyclical
Portfolio Growth Limit Imposed	FHLMC	-$42.8 billion	June 2006	Non-Cyclical
Portfolio Limit Increase	FNMA	+$17.15 billion	Sep. 2007	Cyclical
Portfolio Limit Increase	FHLMC	+$2.14 billion	Sep. 2007	Cyclical
ESA 2008: Jumbo Loan Limit	FNMA	+$41.57 billion	Feb. 2008	Cyclical
ESA 2008: Jumbo Loan Limit	FHLMC	+$41.57 billion	Feb. 2008	Cyclical
Removal of Portfolio Limit	FNMA	+$9.28 billion	Feb. 2008	Non-Cyclical
Removal of Portfolio Limit	FHLMC	+$9.05 billion	Feb. 2008	Non-Cyclical
Reduced Capital Surcharge	FNMA	+$53.33 billion	Mar. 2008	Cyclical
Reduced Capital Surcharge	FHLMC	+$43.33 billion	Mar. 2008	Cyclical
Reduced Capital Surcharge	FNMA	+$17.75 billion	May 2008	Cyclical
HERA 2008: Jumbo Loan Limit	FNMA	-$13.34 billion	July 2008	Cyclical
HERA 2008: Jumbo Loan Limit	FHLMC	-$13.34 billion	July 2008	Cyclical
Conservatorship: Portfolio Limit Increase	FNMA	+$67.5 billion	Sep. 2008	Cyclical
Conservatorship: Portfolio Limit Increase	FHLMC	+$66.75 billion	Sep. 2008	Cyclical
MBS Purchase Program Launch	Treasury	+$80.0 billion	Sep. 2008	Cyclical
QE1 Launch	Fed	+$250.0 billion	Nov. 2008	Cyclical

Policy Description	Agency	Impact	News	Classification
ARRA 2009: Jumbo Loan Limit	FNMA	+$13.34 billion	Feb. 2009	Cyclical
ARRA 2009: Jumbo Loan Limit	FHLMC	+$13.34 billion	Feb. 2009	Cyclical
HASP: Portfolio Limit Increase	FNMA	+$50.0 billion	Feb. 2009	Cyclical
HASP: Portfolio Limit Increase	FHLMC	+$50.0 billion	Feb. 2009	Cyclical
QE1 Expansion	Fed	+$750.0 billion	Mar. 2009	Cyclical
MBS Purchase Program Sales	Treasury	-$120.0 billion	Mar. 2011	Cyclical
Agency MBS Reinvestment	Fed	+$262.0 billion	Sep. 2011	Cyclical
Third SPSPA Amendment	FNMA	-$22.16 billion	Aug. 2012	Non-Cyclical
Third SPSPA Amendment	FHLMC	-$22.16 billion	Aug. 2012	Non-Cyclical
QE3 Launch	Fed	+$480.0 billion	Sep. 2012	Cyclical
QE3 Taper	Fed	-$60.0 billion	Dec. 2013	Cyclical

Notes: Acronyms (in chronological appearance): Housing and Urban Development Act (HUDA); Emergency Home Finance Act (EHFA); Housing and Community Development Act (HCDA); Emergency Home Purchase Act (EHPA); fiscal year (FY); adjustable-rate mortgage (ARM); Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA); Economic Stimulus Act (ESA); Mortgage-backed securities (MBS); Housing and Economic Recovery Act (HERA); quantitative easing (QE); American Recovery and Reinvestment Act (ARRA); Home Affordability and Stability Plan (HASP); and Senior Preferred Stock Purchase Agreements (SPSPA).

Figure 1.3 depicts the interventions as a percentage of the average annualized level of originations in the preceding 12 months. The left (right) panel shows the non-cyclical (cyclical) policy indicator. For reference, each figure also shows credit crisis episodes in grey. The cyclically motivated interventions almost all occur during credit crunches or recessions, while those not motivated by cyclical concerns appear unrelated to the cycle. The largest interventions are those introduced since the start of the 2007/08 financial crisis, which are mostly classified as cyclical.[16] The only post-2006 events that we consider non-

[16]These include the Fed and Treasury MBS programs from late 2008 onwards, but also the

cyclical are the removal of Fannie and Freddie portfolio caps in February 2008, which was contingent on the timely filing of financial reports after the accounting scandals, and a 2012 Treasury decision to accelerate the mandated decline in portfolio caps under the GSE conservatorship agreements. Relative to average originations, the three largest non-cyclical changes are the October 1977 combination of a conforming loan limit increase and the expansion of the Brooke-Cranston Tandem program, an increase in Fannie's debt-to-capital limit in December 1982, and the tightening of Fannie's capital requirements in September 2004 in the wake of the accounting scandals. We refer to Fieldhouse and Mertens (2017) for a detailed discussion of all policy events.

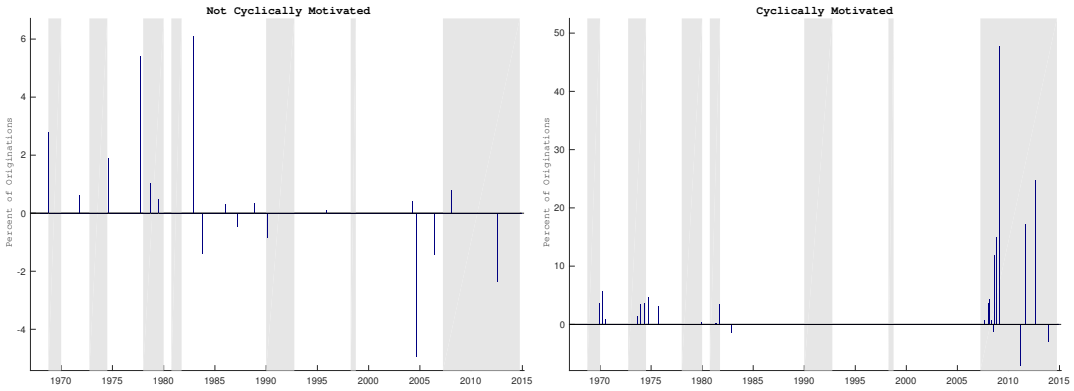

Figure 1.3: Measures of Policy Events Affecting Agency Mortgage Holdings: Jan 1967 to Dec 2014

Notes: The figure shows projected changes in the consolidated agency mortgage portfolio as a percentage of average annualized mortgage originations over the prior twelve months. The left panel shows changes classified as unrelated to the business or financial cycle. The right panel shows changes classified as primarily motivated by cyclical considerations. For sources and classification see Fieldhouse and Mertens (2017). Shaded areas are credit crunch periods, see data appendix for the chronology.

loosening of capital requirements and portfolio caps for Fannie and Freddie and the introduction of 'jumbo' conforming loan limits in 2008.

1.5 The Cumulative Effects of Agency Mortgage Purchases on Mortgage Credit

To assess whether agency purchases influences mortgage lending activity, in this section we present estimates of the cumulative impact on various mortgage credit aggregates. We obtain these estimates by Jordà (2005) local projections estimated by two-stage least squares (2SLS), similar to the methodology proposed in Ramey and Zubairy (2017) to estimate cumulative government spending multipliers, using the non-cyclically motivated policy changes as an instrument for agency purchasing activity. This approach yields easily interpretable results in terms of dollar changes in credit variables, and is well-suited to handle the news aspect of policy announcements.[17]

The first stage in the 2SLS procedure consists of regressions of cumulative agency purchases on the narrative instrument. Recall that agencies typically make advance commitments to buy loans from mortgage providers, and subsequently effectuate these as loans are delivered to the secondary market. Because of potential time delays, we consider monthly data on both the advance net purchase commitments made by the agencies as well as the effective net portfolio purchases as indicators of agency purchasing activity. Specifically, we estimate the following regressions for different horizons h:

$$\frac{\sum_{j=0}^{h} \mathrm{p}_{t+j}}{X_t} = \tilde{\alpha}_h + \tilde{\gamma}_h \frac{m_t}{X_t} + \tilde{\varphi}_h(L) Z_{t-1} + \tilde{u}_{t+h} \tag{1.1}$$

where p_t is either the volume of net commitments or actual purchases by the agencies in month t, expressed in constant dollars using the core PCE price in-

[17] Expressing the impact in terms of elasticities is not feasible since net purchases and net purchase commitments take on negative values in the sample, and is also potentially misleading given the differential growth trends in income, mortgage debt, and agency mortgage holdings.

dex, and $\sum_{j=0}^{h} \mathrm{p}_{t+j}$ is the cumulative sum of purchases or commitments made over the next h-month period. The variable m_t on the right-hand side is the non-cyclical narrative policy indicator from Table 1.2, expressed in constant dollars. We express both as ratios of X_t, a deterministic trend in real personal income obtained by fitting a third degree polynomial of time to the log of personal income deflated by the core PCE price index.[18] The first-stage regressions also include lagged controls, Z_{t-1}, which are defined below.

The cumulative impact on a credit aggregate y_t over a given horizon h is estimated by local projections of the form

$$\frac{y_{t+h} - y_{t-1}}{X_t} = \alpha_h + \gamma_h \frac{\sum_{j=0}^{h} \mathrm{p}_{t+j}}{X_t} + \varphi_h(L) Z_{t-1} + u_{t+h} \tag{1.2}$$

where y_t is expressed in constant dollars using the core PCE price index, and as a ratio of X_t. For stock variables, the dependent variable is the change in the stock between $t-1$ and period $t+h$, scaled by X_t. For credit flow measures, we construct y_t by cumulating the flows f_t such that $y_{t+h} - y_{t-1} = \sum_{j=0}^{h} f_{t+j}$. The coefficient γ_h in (1.2) measures the multiplier associated with an additional dollar in commitments or purchases made between period $t-1$ and $t+h$. This multiplier is the total cumulative dollar change in y_t over the same horizon. We estimate γ_h by 2SLS, i.e. by replacing $\sum_{j=0}^{h} \mathrm{p}_{t+j}/X_t$ with predicted values from the first stage in (2.1). The baseline estimates reported in the rest of this section use an effective sample of 480 monthly observations, starting in January 1967.[19] In appendix IV, we present results for different sample periods.

[18] The results do not differ meaningfully when we use polynomials of different order. In appendix IV, we also show that the results are robust to using a trend in mortgage originations instead of personal income.

[19] With local projections, every successive horizon $h = 0, 1, 2...$ requires a separate regression with h leads of observations beyond the end point of the sample, see Jordà (2005) for a discussion. For $h > 0$, we add the required observations beyond December 2006 such that the number of observations remains constant at $T = 480$ for every h.

Each of the regressions in (2.1) and (1.2) include a full year of monthly lags of a number of control variables Z_t, such that $\varphi_h(L)$ is a lag polynomial of order 11. The controls include variables with predictive content for the dependent variables, and always include lagged values of y_t/X_t (or f_t/X_t for flow variables), as well as lags of agency net purchases and commitments as a ratio of X_t. In addition, Z_t contains lagged growth rates of the core PCE price index, a nominal house price index, and total mortgage debt, the log level of real mortgage originations, housing starts, and lags of several interest rate variables: the 3-month T-bill rate, the 10-year Treasury rate, the conventional mortgage interest rate, and the BAA-AAA corporate bond spread. Finally, we add lags of two cyclical indicators: the unemployment rate and the growth rate of real personal income. All growth rates are quarter-over-quarter. The data appendix provides full details on the sources and construction of the time series. In appendix IV, we discuss results for a number of alternative control (sub)sets.

The central identifying restriction is exogeneity of the instrument, which requires that the residuals in (1.2) and the narrative measure are uncorrelated. To the extent that the lagged controls are informationally equivalent to all relevant impulses to the dependent variables occurring prior to time t, the regression residuals correspond to their horizon h forecast errors. The latter depend only on unpredictable shocks occurring between period t and $t + h$. Our instrument is based on the projected impact of policy events constructed from ex ante information. These estimates should therefore be uncorrelated with shocks occurring after time t. The identifying restriction then boils down to the assumption of contemporaneous exogeneity, i.e. orthogonality between the instrument and all shocks in month t other than the one associated with the policy event itself, see Stock and Watson (2018). If the control set does not fully capture all impulses

prior to date t, then the exogeneity requirement is stricter and the instrument must be uncorrelated with the history of relevant impulses to the left hand side variables. The omission of the cyclically motivated events aims at dropping policy actions that may be correlated with all other time t shocks. Our narrative classification retains the non-cyclically motivated events for which correlation with contemporaneous shocks is unlikely, while the lagged controls provide additional insurance that the confounding effects of any remaining correlations with prior shocks are eliminated, see also Ramey (2016a) and Stock and Watson (2018).

1.5.1 First-Stage Results

We first investigate whether the narrative policy changes indeed lead to significant changes in agency purchasing activity by assessing the strength of our narrative instrument. The left panel of Figure 1.4 shows the Newey and West (1987) robust F-statistics on the excluded instrument in each of the first-stage regressions (2.1) for horizons $h = 0$ to $h = 60$. The figure shows the F-statistics both when we use cumulative commitments or purchases as the measure of agency activity p_t.

The results indicate that the narrative measure is a reasonably strong instrument for agency purchasing activity for horizons between 4 to 48 months after the policy events, with robust F-test statistics exceeding or close to 10. The F-statistics are low for very short horizons. This is natural given the presence of implementation lags and our timing of the policy changes according to the first arrival of news about impending regulatory changes. Beyond horizons of 48

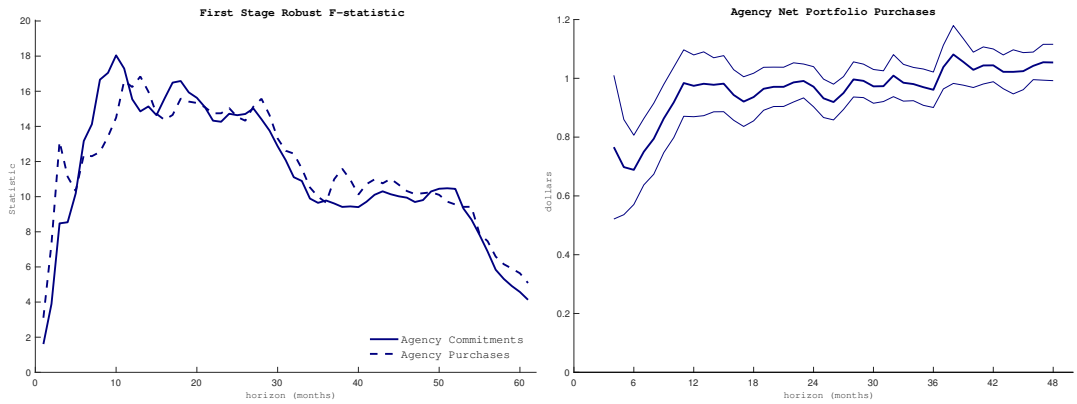

Figure 1.4: First Stage Diagnostics

Notes: The left panel shows Newey and West (1987) robust F-statistics of the first-stage regressions of cumulative agency commitments and purchases, respectively, on the narrative instrument, see eq. (2.1). The right panel shows the estimated dollar increase in agency purchases per dollar increase in commitments. Finer lines in the right panel are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

months, the F-statistics fall to lower levels, which is also not surprising as other influences on agency purchases accumulate with the forecast horizon. Given these results we restrict attention to the 4-48 month horizon.

The left panel of Figure 1.4 shows that the F-statistics are very similar when we instrument for either purchases or commitments. The right panel of Figure 1.4 depicts IV estimates of the dollar change in agency purchases for every dollar of commitments issued over the various time horizons, based on the regressions in (1.2) using cumulative agency purchases as the outcome variable and cumulative commitments as the independent variable. The fine lines denote 95 percent Newey and West (1987) confidence intervals. Because of the time delays associated with secondary market transactions, the pass-through from commitments to purchases is high but smaller than unity for shorter horizons. After about one year the relationship becomes one-for-one with very narrow confidence intervals. The interpretation of the credit multiplier estimates presented next therefore depends somewhat on the denominator used, but only for hori-

zons of less than one year. At longer horizons, there is essentially no difference between using commitments or purchases as the agency action measure.

1.5.2 Cumulative Credit Multipliers

According to the Meltzer-Greenspan view, the portfolio activities of the agencies have no meaningful impact on housing or household debt. Without credit market imperfections, the ownership of mortgage debt is irrelevant. Any change in agency mortgage holdings has no impact on total mortgage debt, but leads instead to perfect crowding out of private holdings. If, on the other hand, there are frictions impeding on the private flow of credit to residential borrowers, agency activity may not be neutral for the volume of mortgage lending. We now examine whether agency mortgage purchases indeed impact housing credit, and test the neutrality hypothesis using the local projections in (1.2) and the narrative policy instrument.

Figure 1.5 shows the impact of an increase in either agency commitments or purchases on mortgage credit aggregates, together with the 95 percent Newey and West (1987) confidence bands. There is a marked difference between the short- and long-run effects. In the short run, the results are consistent with neutrality: The upper left panel shows that a dollar purchased increases agency mortgage holdings initially by almost a dollar. The short-run effect of a dollar increase in commitments on agency holdings is lower at around 60 cents, which is expected given the time delay between commitments and purchases. The upper right panel shows that private holdings decline initially by roughly the same amount as the increase in agency holdings, although the confidence bands

are wide.[20] The middle panels in Figure 1.5 show that as the dollar in mortgage debt changes from private to agency ownership, there are initially no significant changes in originations or mortgage debt.

Over longer horizons, however, there is clear evidence against the notion that agency purchases are neutral for mortgage credit. The cumulative impact on total mortgage originations increases with the horizon and becomes statistically significant after 6 months. Over the course of 3 years and beyond, there is a cumulative increase in originations of 3 dollars or more for every dollar purchased by the agencies. The estimated long-run multipliers for total originations are highly statistically significant and nearly identical for commitments and purchases. The point estimates for the impact on the stock of mortgage debt at shorter horizons are roughly in line with the range reported in Smith, Rosen, and Fallis (1988). The increase in mortgage debt becomes statistically significant after three to four years and in the longer run reaches a level of around one dollar. As the time horizon grows, the increase in agency holdings slowly dissipates toward levels expected before the expansion. Similarly, the negative impact on the level of private mortgage holdings vanishes over time and eventually turns into an increase, although not one that is statistically significant.

The results in the middle row of Figure 1.5 imply that agency portfolio expansions lead to a substantial rise in mortgage lending activity. Originations take place when borrowers refinance, purchase an existing home, or purchase a new home. Unless there are changes in house prices or homeownership, the first two transactions typically lead only to small net changes in mortgage debt

[20] This almost surely reflects the fact that our measure of private holdings is partially based on interpolation of quarterly data. Private holdings are measured by subtracting agency holdings from total mortgage debt. Total mortgage debt is constructed using monthly data on originations and an interpolation of implied quarterly repayment rates. See the data appendix for more detail.

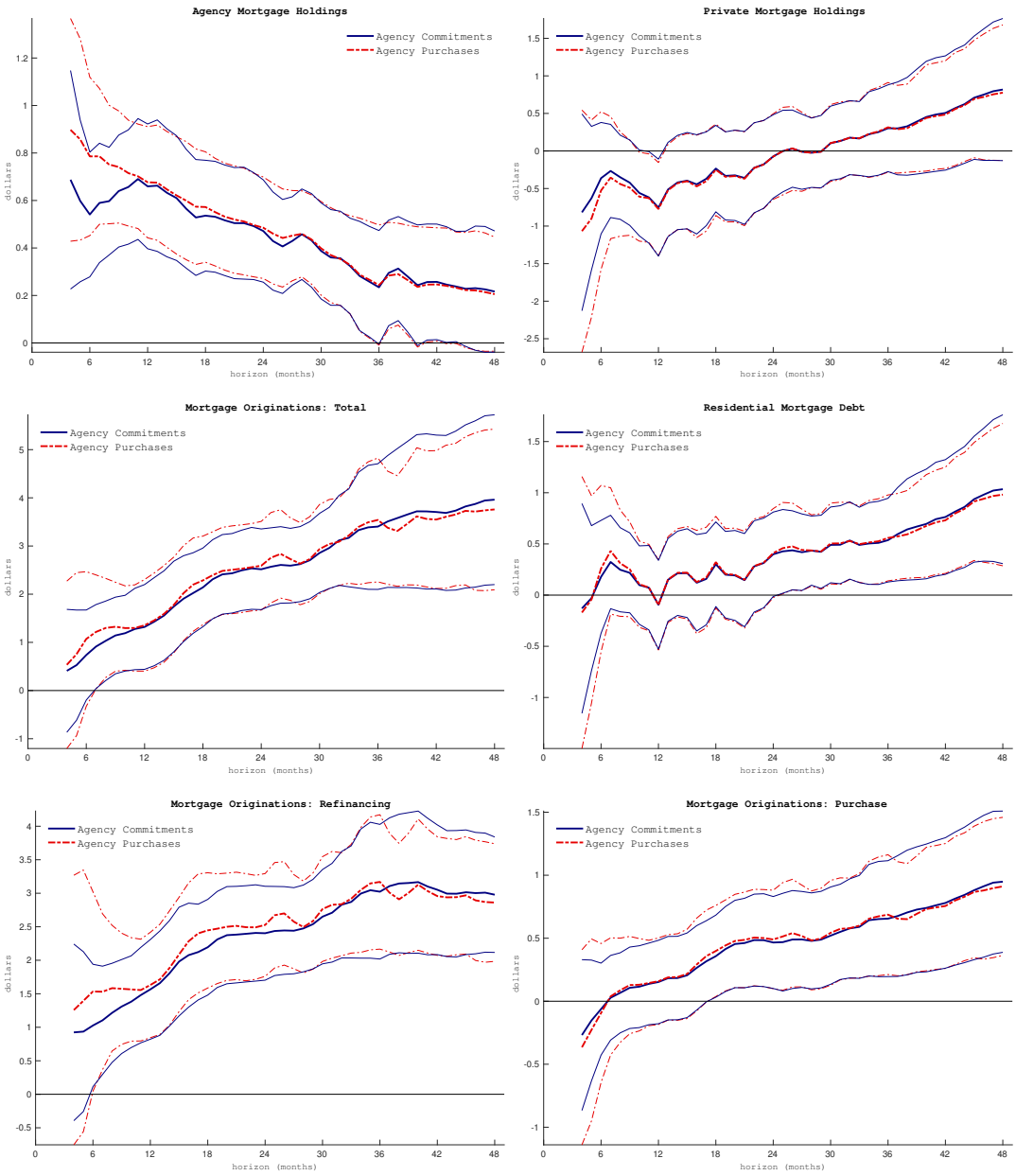

Figure 1.5: Estimated Balance Sheet Adjustments and Mortgage Credit Multipliers Associated with Agency Mortgage Purchases

Notes: The figure shows dollar changes in the variable listed per dollar increase in agency net portfolio purchases or commitments to purchase cumulated over the reported horizon in months. Estimates are from local projections-IV regressions, see eq. (1.2). Finer lines are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006. In the bottom row panels, the sample excludes May 1985 to Dec 1986 because of missing data on refinance shares, see data appendix.

because a similar amount of mortgage debt is repaid. Since the increase in originations is a multiple of the net change in debt, it is likely driven mostly by a rise in transactions of the first two types, with new home purchases playing a more important role beyond horizons of two years. The bottom row of Figure 1.5 distinguishes between refinancing originations in the left panel, and home purchase originations in the right.[21] Refinancing originations indeed respond faster and by a substantially larger amount than purchase originations. Refinancing originations see a statistically significant increase beyond 6 months, and within 3 years are higher by roughly 3 dollars per dollar of agency purchases. Home purchase originations rise more slowly and are statistically significantly higher after 18 months, increasing by nearly one dollar within 4 years. The rise in purchase originations occurs somewhat faster than the rise in total mortgage debt, suggesting that existing home sales respond before new home sales. The longer-run cumulative change in purchase originations is comparable to the increase in mortgage debt, which suggests a positive impact on residential construction. In the impulse response analysis below, we indeed find evidence for an increase in housing starts. We also document positive effects on homeownership rates and, although less clearly, on home prices, both of which also contribute to the rise in mortgage debt. The bulk of the effect on originations is nevertheless due to refinancing.[22]

A comparison of the 2SLS and OLS estimates of the credit multipliers is informative about which of the sources of endogeneity bias discussed in Section 1.4.1 dominates in practice. A priori the direction of the bias in the OLS esti-

[21] Data prior to 1990 is approximated using the refinancing share of S&Ls, see data appendix. Unfortunately, we were unable to find data distinguishing between originations for new and existing home sales with a sufficient time span.

[22] This is consistent with Di Maggio et al. (2016), who document an increase in refinancing activity by 170 percent during the Fed's first QE program.

mates is ambiguous. Systematic GSE expansions during times of high primary market mortgage demand or high private sector credit supply are likely to bias the OLS estimates upward relative to the true effects. The systematic stabilizing actions of the agencies or their regulators, on the other hand, instead lead to a downward bias. By using only the predicted variation in agency purchases resulting from GSE regulatory changes, the 2SLS estimates aim to eliminate the upward or downward biases resulting from any systematic patterns in regular GSE purchasing behavior. The restriction to non-cyclically motivated regulatory changes further eliminates the additional potential downward OLS bias due systematic countercyclical actions by policymakers in response to economic and financial conditions. Recall also that the inclusion of the lagged financial and cyclical controls generally weakens the exogeneity requirement on the instrument, up to the point where the non-cyclical policy interventions need only be contemporaneously uncorrelated with other determinants of the credit aggregates, see Stock and Watson (2018).

Figure 1.6 compares the OLS and 2SLS estimates of the cumulative impact on total mortgage originations. Given the strong procyclicality of originations, the large and consistently positive OLS and 2SLS estimates make it unlikely that either estimates are severely contaminated by the countercyclical actions of the agencies over the sample. However, Figure 1.6 also shows that, regardless of whether the baseline or full set of controls is included, the OLS estimates exceed the 2SLS estimates for horizons up to 2 years. Moreover, the OLS estimates are roughly independent of the horizon, implying that the bulk of the increase in originations occurs within a few months. The 2SLS estimates instead show a delayed and more gradual increase in originations. This pattern suggests that the dominant source of bias in the OLS estimates is the systematic process of private

lenders passing on loans to the agencies very shortly after origination. A GSE policy of maintaining market share, for instance, would be consistent with originations rising before or roughly simultaneously with agency purchases, and without a decline in private holdings. The delayed and more gradual effect on originations that emerges after instrumentation, together with a short-run decrease in private holdings, suggests that the 2SLS estimates are not picking up increased supply of mortgages to the secondary market. Given the decision lags and time delays associated with making new mortgage loans, the delayed and gradual rise in originations after instrumenting seems instead much more consistent with a causal interpretation.

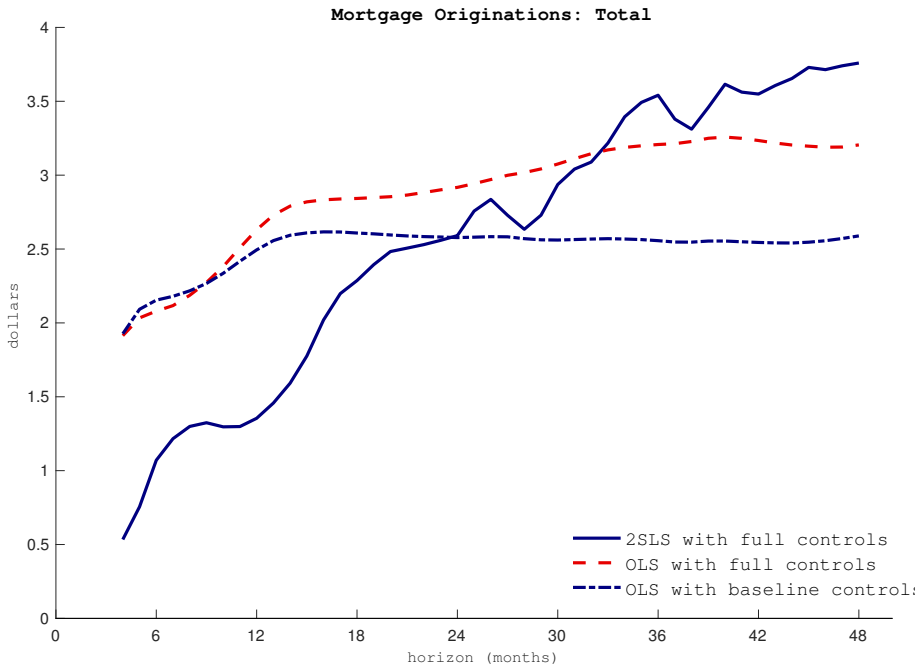

Figure 1.6: The Role of Instrumentation

Notes: The figure shows dollar changes per dollar increase in agency net portfolio purchases cumulated over the reported horizon in months. The benchmark estimates are from local projections as in equation (1.2), comparing OLS and 2SLS estimates. The specification with baseline controls excludes the interest rate and cyclical controls.

In appendix IV, we elaborate on the role of instrumenting, and we discuss

additional results on agency securitization. We also verify robustness in several dimensions, such as the choice of scaling variable X_t, the sample choice, the set of controls, as well as the exclusion of specific policy events in the narrative instrument. The expansionary effects of agency purchases on mortgage credit are shown to be robust to many details of the analysis.

1.6 Impulse Response Analysis of News Shocks to Agency Purchases

To evaluate the effects of agency purchases on residential investment and homeownership, as well as analyze the response of interest rates and other macro aggregates, in this section we conduct an impulse response analysis of shocks to agency mortgage purchases. Given the gradual and anticipated nature of agency balance sheet expansions, our goal is to identify the response to shocks to expectations of future agency purchasing activity. We adopt a local projections approach and use the narrative instrument for identification.

1.6.1 Empirical Specification

For a given monthly outcome variable y_t, we estimate the response at horizon h based on

$$y_{t+h} - y_{t-1} = \alpha_h + \delta_h \left(\frac{12}{8} \times \frac{\sum_{j=0}^{7} \mathrm{P}_{t+j}}{\tilde{X}_t} \right) + \varphi_h(L) Z_{t-1} + u_{t+h}. \tag{1.3}$$

The right hand side variable of interest measures annualized agency commitments made over an 8 month period, expressed as a ratio of $\tilde{X}_t$, a long-run trend

in annualized originations. The latter is obtained by fitting a third degree polynomial of time to the log of real originations obtained using the core PCE price index as the deflator. The control variables Z_{t-1} are the same as in equation (1.2) estimating dollar cumulative effects. The first-stage regression is the same as in (2.1), but with $(12/8)\sum_{j=0}^{7} \mathrm{p}_{t+j}/\tilde{X}_t$ as the dependent variable and $m_t/\tilde{X}_t$ as regressor. When an outcome variable is not included in the benchmark control set, we always add 12 monthly lags of that variable as additional controls (in growth rates for trending variables and in levels for other variables).

The regression in (1.3) estimates the month $h \geq 0$ response to a time 0 news shock to agency purchases. Expected agency purchases are proxied by agency commitments made over the next 8 months. We choose an 8 month horizon to measure expected future commitments because at this horizon the robust F-statistic associated with the narrative instrument in the first-stage regression is the largest, and equals 11.68. The results are very similar for somewhat shorter or longer horizons. To address endogeneity, we use the indicator of non-cyclical policy events, deflated by the core PCE price index and scaled by trend originations $\tilde{X}_t$, as the instrument. The IV estimates of δ_h in (1.3) can be interpreted as the response associated with a one percentage point increase in the agency flow market share that becomes anticipated h periods before. For perspective, the average market share in terms of portfolio purchases was approximately 7 percent between 1967 and 1990, and about 15 percent between 1990 and 2006, see Figure 1.1.

1.6.2 Effects on Mortgage Credit and Interest Rates

Figure 1.7 displays the responses of mortgage credit and interest rates to news about higher future purchases. Each of the panels shows the point estimates and 68 and 95 percent confidence bands for the first 24 months after an increase in anticipated agency purchases by one percentage point of trend originations.

The first row in Figure 1.7 displays the responses of real originations and mortgage debt to the agency purchase shock. Mortgage originations start rising after a few months and reach peak increases of 4 percent to 5 percent between 12 and 18 months after the shock. With a slightly longer delay, the stock of mortgage debt also gradually rises to levels that are about 0.3 percent higher after two years. The expansions in both the stock and gross flow of mortgage credit following a positive shock to agency purchases are statistically significant for multiple periods. The results again indicate that agency purchases stimulate mortgage lending significantly. Appendix IV shows that the impulse response analysis also confirms that refinancing accounts for a large share of the increase in originations.

The second row in Figure 1.7 shows the impact on interest rates on 30-year fixed rate mortgages in the primary market. The left panel illustrates the interest rate effect on newly originated conventional/conforming mortgages, whereas the right pane contains the impact on interest rates of mortgages guaranteed by the Federal Housing Administration. The mortgage rates in the primary market are largely unaffected in the initial months after the increase in agency mortgage purchase commitments. As the agencies' purchasing activity picks up, however, both mortgage rates gradually decline and are lower by around 10 basis points after 6 months. The declines in mortgages rates appear quite

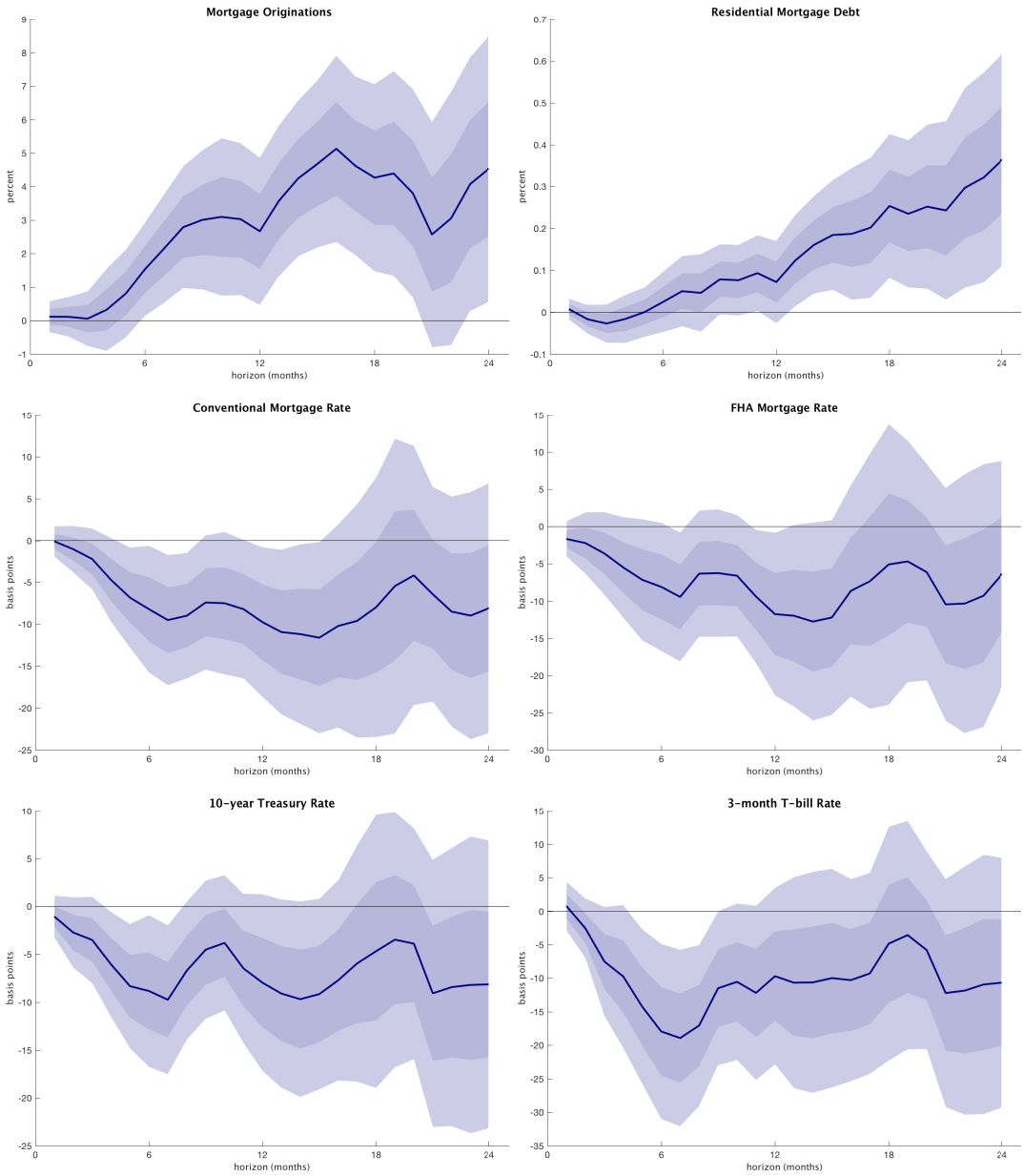

Figure 1.7: Impulse Responses to a Shock to Anticipated Agency Purchases

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see eq. (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

persistent, are statistically significant for multiple periods, and help explain the increase in refinancing activity. A decrease in mortgage cost is consistent with agency purchases affecting the aggregate supply of housing credit, for instance

because of portfolio rebalancing effects or because private mortgage lenders are capital constrained. Agency purchases also alleviate any constraints faced by private intermediaries, for instance because the higher prices of mortgage assets improve their net worth, or because the sale of mortgages in exchange for agency debt lowers their risk-weighted leverage.

The issuance of agency debt to finance the mortgage purchases potentially puts upward pressure on interest rates on other debt instruments. Such pressure may be limited if significant amounts of agency debt are purchased by foreign investors, as has been the case since the mid-1980s, or by the Federal Reserve, as was the case in the early years of our sample. Depending on the level of segmentation in financial markets, the rebalancing and other effects may also spill over to other asset markets and cause the yields on substitutes to mortgages to fall. These include other high duration instruments such as long-term Treasuries and corporate bonds. In addition, lower mortgage rates lead to more prepayments, which do not carry any penalty in the United States. There is considerable evidence that lower effective durations cause mortgage investors to bid up the price of higher duration instruments, see for instance Boudoukh et al. (1997), Perli and Sack (2003), Hanson (2014), and Malkhozov et al. (2016). The broader impact on long-term yields is therefore ex ante not clear.

The left panel of the bottom row in Figure 1.7 shows the estimated response of the 10-year Treasury rate. The results are very similar to those for the long-term mortgage rates just discussed: The 10-year Treasury rate responds little the first couple of months, but as the agency mortgage purchases commence, it declines in a gradual and persistent manner by up to 5 to 10 basis points. The drop is significant at the 95 percent level between 3 and 6 months after the

shock. The right panel in the bottom row of Figure 1.7 reports the impact on the 3-month T-bill rate. The results are qualitatively similar to those for the long-term rates discussed above. Quantitatively, we find some indication of a larger drop in short-term rates than in the longer-term rates. With a delay of a few months, the T-bill rate drops persistently by 15 to 20 basis points with a partial reversion taking place at longer forecast horizons. The negative response of short-term interest rates indicates that a potentially important explanation for the expansion in mortgage lending and the decline in mortgage rates is a more accommodative stance of monetary policy. In Section 1.7 below, we investigate the role of monetary policy and its interactions with housing credit policy in greater detail.

Figure 1.8 shows additional results on the effects on other interest rates and credit spreads. The first two panels show the responses of the AAA-rated and BAA-rated long-term corporate bond yields. Taken together, the results suggest that agency purchases exert a downward pressure on corporate yields with a timing that coincides with the actual purchasing of mortgage assets by the agencies. The response of the corporate yields is qualitatively similar to those of mortgage and Treasury rates, showing initially no effect, and subsequently a gradual decline. The 95 percent confidence bands around the responses are relatively wide, and the responses are only marginally significant. The declines in corporate bond yields are also quantitatively smaller than mortgage and Treasury rates. The third panel in the first row of Figure 1.8 shows statistically significant short-run increases in the spread between AAA-rated corporate bonds and 10-year Treasuries. Agency purchases appear therefore to induce the greatest spill-overs on the demand for the relative liquidity and safety of Treasuries, which do not have prepayment risk. The increases are, however, relatively

short-lived, with the effects disappearing after 7 or 8 months. The next panel shows evidence for a drop in the spread between BAA and AAA-rated corporate bonds after 7 or 8 months, suggesting also some positive spill-over effects on the demand for riskier long-term bonds. The final two panels of Figure 1.8 show declines in the spreads of mortgage rates over the 10-year Treasure rates of a few basis points after about 6 months. The declines are at best only marginally significant, indicating that agency purchases have important positive spill-over effects on the demand for long-term Treasuries.

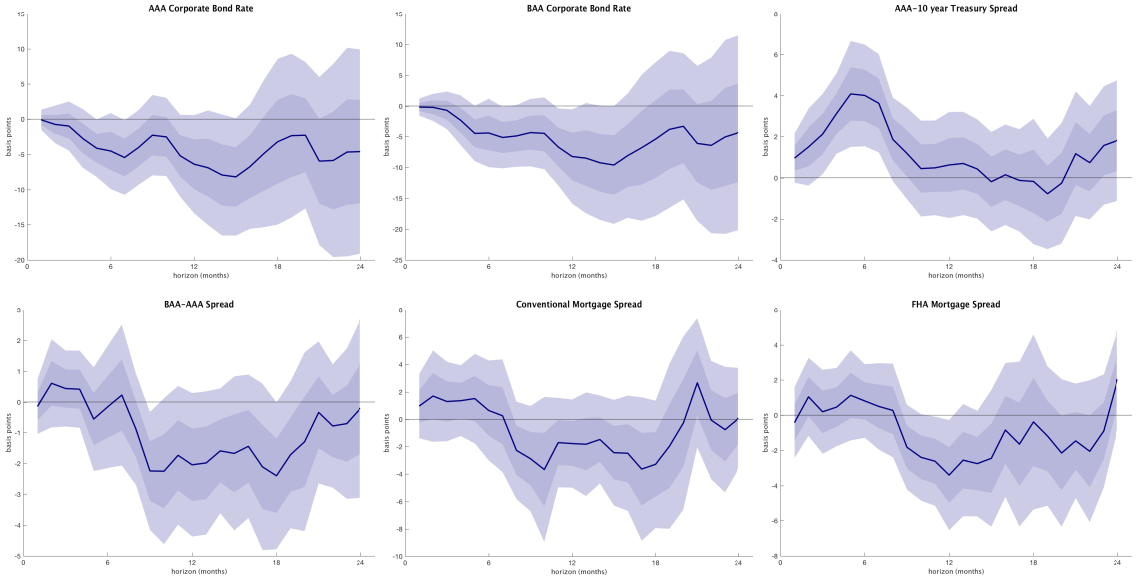

Figure 1.8: Impulse Responses to a Shock to Anticipated Agency Purchases

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see eq. (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

The finding that increases in agency mortgage purchases produce a boom in mortgage lending and declining interest rates is robust. Figure 1.9 shows the response to a shock to anticipated agency purchases for the benchmark specification together with those when we omit in turn each of the three largest pol-

icy interventions from the narrative instrument: the October 1977 conforming loan limit increase and expansion of the Brooke-Cranston Tandem program, the December 1982 increase in Fannie Mae's debt-to-capital limit, and the September 2004 tightening of capital requirements following the accounting scandals. In each case we add the omitted event as a separate dummy variable, including both the contemporaneous value and twelve lags to the control variables. While there is some variation in the size of the responses, the results remain qualitatively similar to the benchmark narrative estimates. In all cases, there are increases in originations and mortgage debt, and declines in short- and long-term interest rates. We also obtained very similar results for samples that omit the Volcker years, or for the subsample starting in October 1982, the end of the period of non-borrowed reserve targeting by the Federal Reserve.[23] Thus, the results are not driven by differences in Federal Reserve operating procedures in the 1970s or by the inclusion of the Volcker period. There is narrative evidence that political pressure to support the GSEs was exerted with some success in the late 1960s and 1970s, leading for instance the Federal Reserve to purchase significant amounts of agency debt, see Haltom and Sharp (2014). In the post-1982 sample, however, it seems less likely that political pressure to support government housing policies can explain an accommodative monetary policy response.

Finally, in the appendix we report additional results based on using shocks to GSE excess stock returns as an alternative instrument for agency purchasing activity. This different approach is inspired by Fisher and Peters (2010), who use innovations in defense stocks to identify the effects of news shocks to military spending. The special GSE status is likely to account for the bulk of Fannie's

[23]The results are available in the appendix.

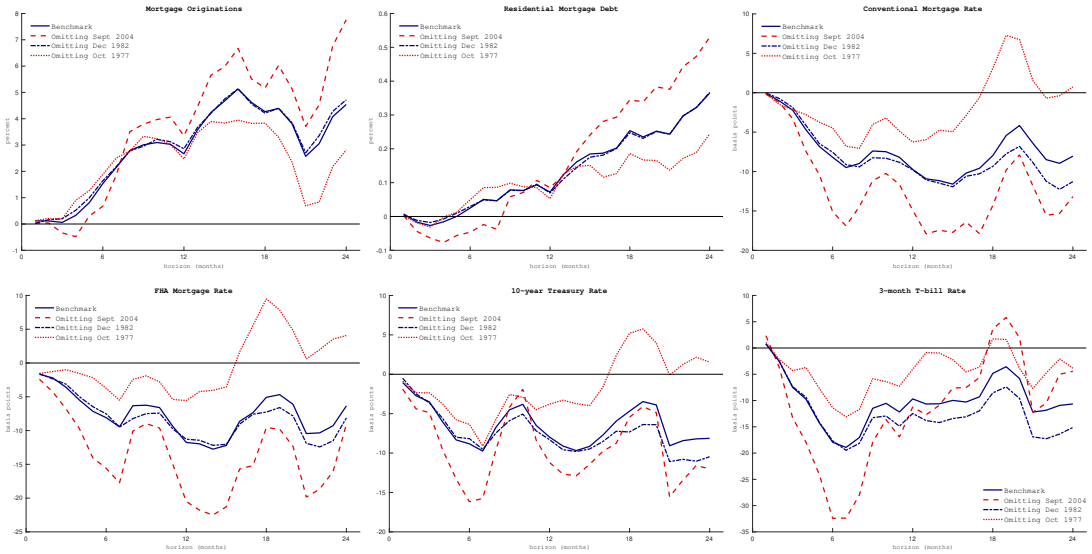

Figure 1.9: Impulse Responses when Omitting Largest Policy Events

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with different subsets of the narrative policy indicator, see eq. (1.3). Sample: Jan 1967 to Dec 2006.

and Freddie's market value and portfolio size, see e.g. Passmore (2005). We can therefore expect that idiosyncratic movements in GSE stock prices reflect unanticipated changes in the value of their GSE status and expected purchasing activity. Controlling for market-wide and real estate sector returns, as well as a wide range of other macroeconomic and financial factors, we find that residual variation in Fannie and Freddie excess stock returns predicts agency mortgage purchases. This motivates us to use this residual variation as an alternative instrumental variable to estimate the response of credit aggregates to shocks to agency mortgage purchases. The resulting impulse response estimates, which are discussed in the appendix, lead to very similar conclusions as those based on the narrative instrument.

1.6.3 Effects on Housing and Other Macro Aggregates

Next, we assess the evidence for the broader macroeconomic effects of government asset purchases. Figure 1.10 shows the responses of a range of monthly macro aggregates to an agency purchase shock. As in Figure 1.7, the responses are to an anticipated increase in purchases by one percentage point of trend originations, estimated by the regression in (1.3) and using the narrative instrument. We consider the following additional outcome variables at the monthly frequency: housing starts, real house prices, the homeownership rate, real personal consumption expenditures, real personal income, and the unemployment rate.[24]

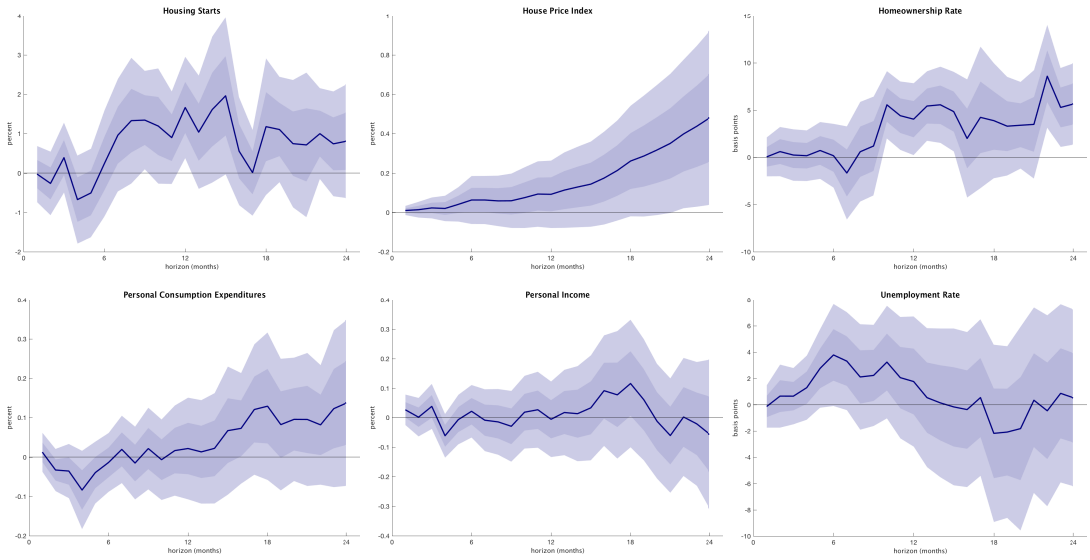

Figure 1.10: Impulse Responses to a Shock to Anticipated Agency Purchases

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

[24] All these variables, except the unemployment and the homeownership rate, are included logs and all nominal variables are deflated by the core PCE price index. The homeownership rate is only available at quarterly frequency, and the monthly series in this case simply consists of the quarter values. See the data appendix for precise definitions and sources.

The first panel in Figure 1.10 shows the effects on residential investment, as measured by monthly housing starts. Based on the narrative instrument, the number of new housing starts rises to levels that are roughly 1 to 2 percent higher after about 6 months. Housing starts remain elevated for about a year and drop off to prior levels afterwards. We thus find evidence that the expansion in the stock of mortgage debt following a shock to agency purchases is associated with higher levels of residential investment.[25] The top middle panel in Figure 1.10 plots the impact on real house prices, as measured by the Freddie Mac house price index deflated by the core PCE price index. We find that real house prices rise gradually but very persistently over time, with a point estimate that becomes significantly positive at longer forecast horizons only. The increase in house prices is quantitatively relatively small and imprecisely estimated. Thus, we have no clearcut evidence of any strong impact of agency mortgage purchases on house prices. The size of the point estimates imply that only some of the dollar increase in gross mortgage credit flows can be explained by increases in house prices.

The top right panel in Figure 1.10 shows the response of the homeownership rate, as measured by the Census Bureau, which is often cited as one of the primary motivations for housing credit policy. There is a sustained increase in homeownership by around 5 basis points beyond a horizon of 10 months. While there is considerable uncertainty in the estimates, the responses are statistically significant at the 95 percent level for multiple months, indicating that agency activity indeed has an effect on homeownership. This also implies that the expansion in the stock of mortgage debt is in part driven by an increase in

[25]The more immediate effects on residential construction are consistent with the more delayed impact on mortgage debt in Figure 1.7. This is because financing in the building phase is typically through a short-term construction loan that is converted into a residential mortgage loans only after the borrower takes up occupancy of the house.

homeownership.

The remaining panels in Figure 1.10 show the responses of consumption expenditures, personal income, and the unemployment rate. Using the narrative instrument, we find that an increase in agency mortgage purchases stimulates consumption very modestly and with a delay of more than a year. Personal sector income and the unemployment rate are roughly unchanged over the entire forecast horizon. The increase in consumption is imprecisely estimated and none of the impulse responses are significantly different from zero at the 95 percent level. There is an initial rise and a subsequent decline in the unemployment rate around a year after the shock, but the magnitudes of these changes are small and not statistically significant.

The alternative GSE excess returns identification strategy discussed in appendix II yields overall comparable results, including a statistically significant rise in housing starts, as well as a significant and persistent rise in homeownership.[26] Our overall conclusion, therefore, is that there is evidence that agency mortgage purchases stimulate residential investment and homeownership, and some indication of a positive effect on personal consumption expenditures. The confidence bands in Figure 1.10 are, however, relatively wide, and the power of our instruments to detect a macroeconomic impact of agency mortgage purchases beyond the housing sector is limited.

[26]The main exception is that the GSE excess returns instrument yields no evidence for any significant rise in house prices.

1.7 Housing Credit Policy vs. Conventional Monetary Policy

In the previous section, we found that increases in agency mortgage purchases lead to an expansion in mortgage credit and to declines in short- and long-term interest rates. A natural question to ask is to what extent these effects reflect conventional monetary policy actions, and how monetary and credit policies interact more broadly. The left panel in Figure 1.11 reports the estimated response of the federal funds rate to an agency purchase shock obtained using the methods of the previous section. Based on the narrative instrument, there is a delayed and transitory decline in the funds rate by up to 30 basis points after 6 months. This decrease is statistically significant at conventional levels after 4 to 12 months.

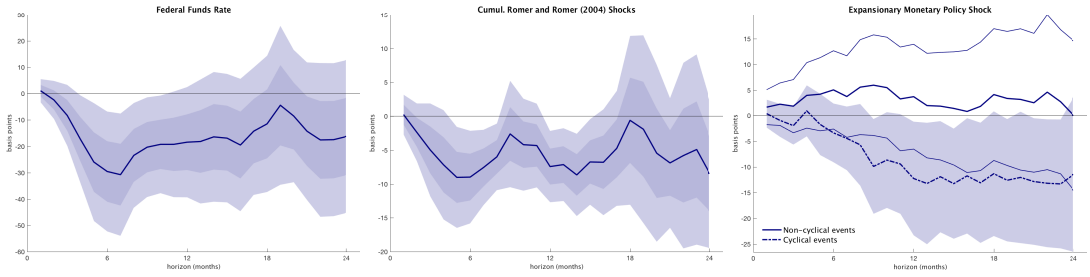

Figure 1.11: Interactions Between Monetary and Credit Policies

Notes: The left and middle panels show responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. The right panel shows responses to a monetary shock obtained by local projections-IV regressions on the 3-month T-bill rate and instrumenting with the Romer and Romer (2004) monetary policy shock measure. Finer lines and shaded areas in the right panel are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

We obtain similar declines in short-term interest rates for the post-1982 subsample, after excluding the non-borrowed reserves targeting period, or after omitting larger policy events from the narrative instrument (see appendix IV.

We therefore conclude that there is evidence that agency mortgage purchases are accompanied by accommodative monetary policy. A possible alternative interpretation is that our identification scheme erroneously picks up the influence of recessionary shocks causing downward adjustments in the Federal Reserve's interest rate target. However, if this were the case, we would not expect to find increases in strongly procyclical variables such as mortgage originations or housing starts. To gain more insight into the nature of the funds rate response, we make use of the decomposition by Romer and Romer (2004) of changes in the intended funds rate at FOMC meetings into a *systematic* and a residual *shock* component.[27] The systematic component is measured by the explained variation in a regression of target changes on changes in Greenbook forecasts of inflation, output growth, and unemployment. Monetary policy shocks are measured by the residuals in the regression, and capture the remaining variation in target changes not explained by changes in the Greenbook forecasts.

The middle panel in Figure 1.11 depicts the estimated response of the cumulative Romer and Romer (2004) shocks to an agency purchase shock using the regressions in (1.3). With a few months delay, the narrative instrument yields a significant and persistent decline by up to 10 basis points. The funds rate decline is therefore not explained by inflation and output considerations alone, and possibly also reflects an independent reaction to credit market conditions and/or credit policies.

To investigate whether monetary policy affects housing credit policy, the right panel in Figure 1.11 reports the response of the cumulated narrative measures of credit policy changes in Table 1.2, deflated by the core PCE price index and expressed as a percentage of trend originations, to a monetary shock. The

[27] We use the updates by Wieland and Yang (2016) to extend the sample of the original series.

response to a monetary shock is obtained by similar regressions as in equation (1.3), but replacing the agency market share on the right-hand side with the contemporaneous level of the 3-month T-bill rate, and using the Romer and Romer (2004) shock measure as an instrument.[28] The results indicate there is no evidence for monetary policy shocks impacting the non-cyclical measure of agency purchase shocks, as our narratively identified housing credit policy instrument is not itself predictable by the Romer and Romer (2004) residuals. This provides assurance that our narrative instrument does not erroneously pick up the effects of monetary policy shocks. Similarly, adding the current and lagged values of the Romer and Romer (2004) shocks as additional control variables in (1.3) also has very little effect on the results, see appendix IV. The *cyclical* housing policy measure (in red), on the other hand, does show a statistically significant decline following an expansionary monetary policy shock, which illustrates the importance of accounting for the endogeneity of credit policies. Consistent with an objective of stabilizing credit flows, we thus find that housing credit policies on average act to offset the effects of monetary policy disturbances.

To further judge the extent to which agency purchase shocks operate through more conventional monetary transmission channels, Figure 1.12 compares the impact of a traditional monetary policy shock (in red) with the response to the agency purchase shock identified using the narrative instrument (in blue). These responses are again obtained by local projections as in (1.3), but with the contemporaneous 3-month T-bill rate as the right-hand side variable and the Romer and Romer (2004) residuals as the instrument. In the figure, the impact

[28]Conditional on including an informationally sufficient set of lagged variables as controls, valid identification under this approach requires only contemporaneous exogeneity of the Romer and Romer (2004) shocks. The predictability of the Romer and Romer (2004) shocks by agency purchase shock therefore does not necessarily invalidate the identification of the response to monetary shocks.

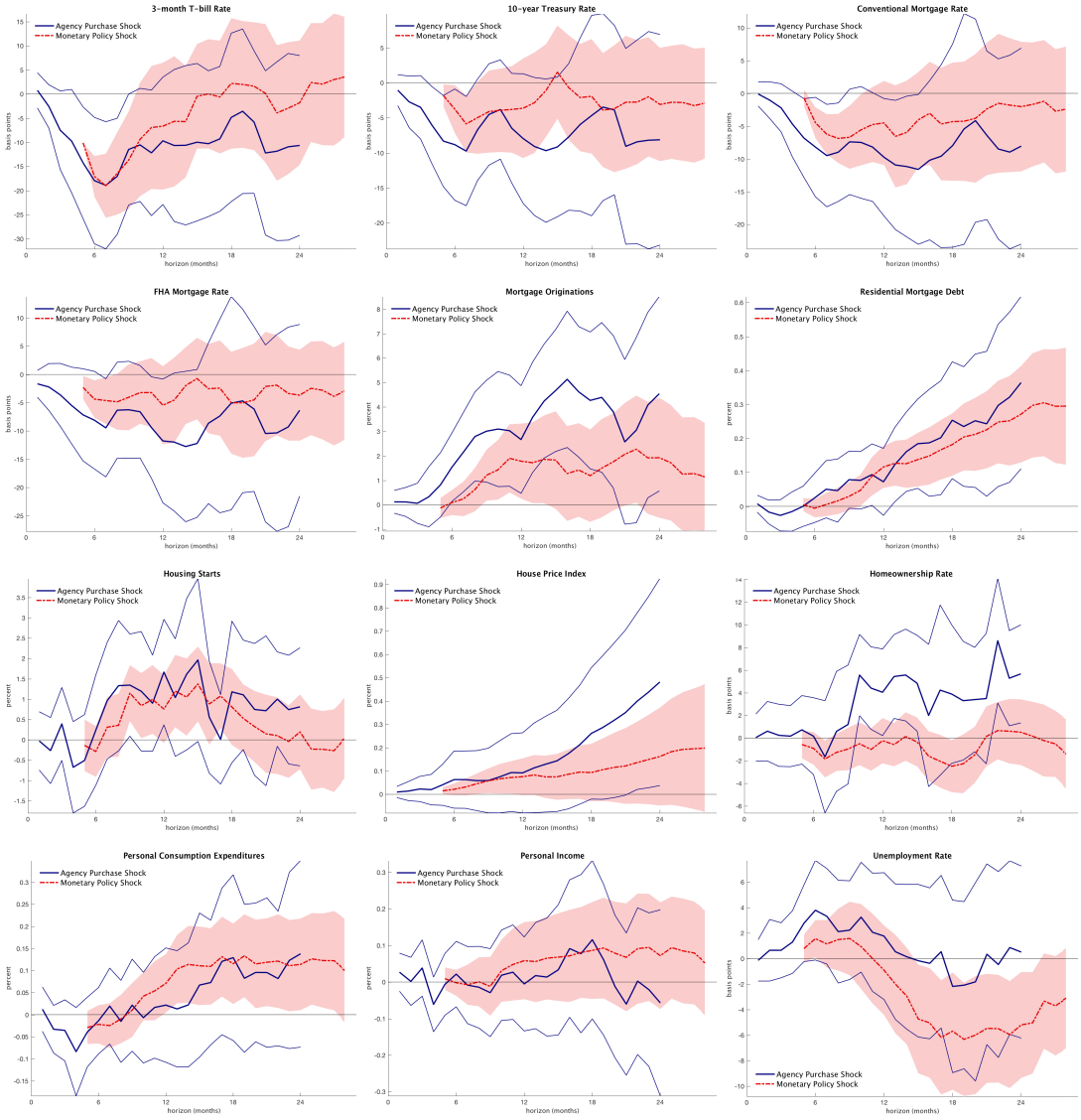

Figure 1.12: Responses to a Shock to Anticipated Agency Purchases Versus a Monetary Policy Shock

Notes: The figure shows responses to a one pp. increase in the expected future agency market share as well as the response to a monetary policy shock. Estimates are from local projections-IV regressions instrumenting agency commitments with the narrative policy indicator, see equation (1.3), and instrumenting the 3-month T-bill rate with the Romer and Romer (2004) monetary policy shock measure. Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

of the interest rate shock is scaled such that the maximum decline in the 3-month T-bill rate is the same as for the agency purchase shock identified with the narrative instrument. For easier comparison, the responses to the monetary policy

shock in Figure 1.12 are shifted forward by 4 months such that the maximum interest declines for each of the policy shocks coincide. The bands shown are the 95 percent Newey and West (1987) confidence intervals.

Figure 1.12 reveals that conventional monetary policy shocks and credit policy shocks have qualitatively similar effects on many of the variables shown. Although each of the policies involves purchases of different types of assets with different sources of financing, both generate a decline in long-term interest rates, a rise in originations and mortgage debt, and an increase in housing starts. Consistent with most of the existing empirical literature, an expansionary monetary shock leads to increases in consumption and income and a decline in the unemployment rate.[29] The monetary shock responses provide a familiar reference point for judging the quantitative impact of agency purchase shocks. After scaling the estimates to imply the same decline in the short-term interest rate and accounting for the more immediate effects of a funds rate target shock on short-term interest rates, many responses to each of the policy shocks are similar in terms of magnitude and timing.

There are, however, also some notable differences between the responses in Figure 1.12. The first is that agency purchases lead to a rise in originations that is roughly twice as large as that of the interest rate shock. There is little indication that a conventional monetary policy shock causes a significant rise in real house prices, while the decline in long-term interest rates is slightly more pronounced and persistent after an agency purchase shock. Both the rise in housing starts and mortgage debt, on the other hand, are very similar for both policy shocks. Taken together, the results indicate that agency purchases have a larger effect

[29]The response to both shocks also feature a similar 'price puzzle', i.e. a decline in the price level as measured by the PCE price index. Results are available on request.

on mortgage repayments than conventional interest rate policy. In appendix IV, we compare the responses of refinance and purchase originations. Whereas purchase originations respond very similarly to both shocks, refinancing originations react more strongly to the agency purchase shock, and account for the entire difference in the effect on total originations.

Another notable difference between credit policy and traditional interest rate shocks is the effect on the homeownership rate (right panel, third row in Figure 1.12). Unlike the response to an agency purchase shock, there is no indication that a conventional interest rate shock has any positive effect on homeownership. In most months, the estimated effect on homeownership instead is negative, though small and generally not statistically significant. Apart from the different response of originations and homeownership, however, it does appear as if credit policy operates through similar transmission channels as conventional monetary policy.

In appendix IV, we compare agency activity and conventional monetary shocks in terms of their contribution to fluctuations in credit aggregates and interest rates. Because our local projections approach is not well suited for this purpose, we assess the variance contributions in a proxy SVAR setting (Mertens and Ravn, 2013) using the GSE excess returns identification strategy and the Romer and Romer (2004) residuals as a proxy for monetary shocks. The main finding is that GSE excess returns shocks explain up to 15 and 10 percent of the medium-run forecast error variance of mortgage originations and housing starts, respectively, which is roughly comparable to the contribution of monetary policy shocks. In addition, while shocks to monetary policy are substantially more important for the variance of interest rates in the short run, the role

of GSE excess returns shocks for long-term interest rates exceeds the role of monetary policy shocks at longer horizons. The SVAR-based analysis overall indicates that the contribution of credit policy shocks to fluctuations in housing and credit markets is non-negligible.

To explore the potential effects of agency mortgage purchases when conventional interest rate policy does not respond, for instance because it is constrained by the zero lower bound, Figure 1.13 reports the results from a counterfactual experiment in which the short-term interest rate is assumed to remain constant. As before, the responses are to an increase in anticipated agency purchases by one percentage point of trend originations, as in (1.3). However, we now additionally assume the realization of a sequence of monetary shocks such that the 3-month T-bill rate remains unchanged at every horizon.[30] An important caveat with this experiment is that the short-term rate remains constant because of successive monetary surprises rather than an anticipated policy response. As such, the results are clearly subject to the Lucas critique. Figure 1.13 shows the counterfactual responses in red and the earlier baseline estimates in blue, in both cases with 95 percent Newey and West (1987) bands.

The results from the counterfactual experiment in Figure 1.13 suggests that conventional monetary policy plays an important role in explaining the effects of agency purchase shocks. The rise in originations is only about half as large when short-term interest rates remain constant, and there is no longer any sign of an increase in the stock of mortgage debt. The drop in long-term interest rates is much reduced, and the positive effect on housing starts disappears entirely. The combination of expansionary monetary and credit policy therefore

[30]The impact of monetary shocks on the outcome variables is obtained as in Figure 1.12, i.e. by using the Romer and Romer (2004) shocks as an instrument in local projections on the 3-month T-bill rate and the control variables.

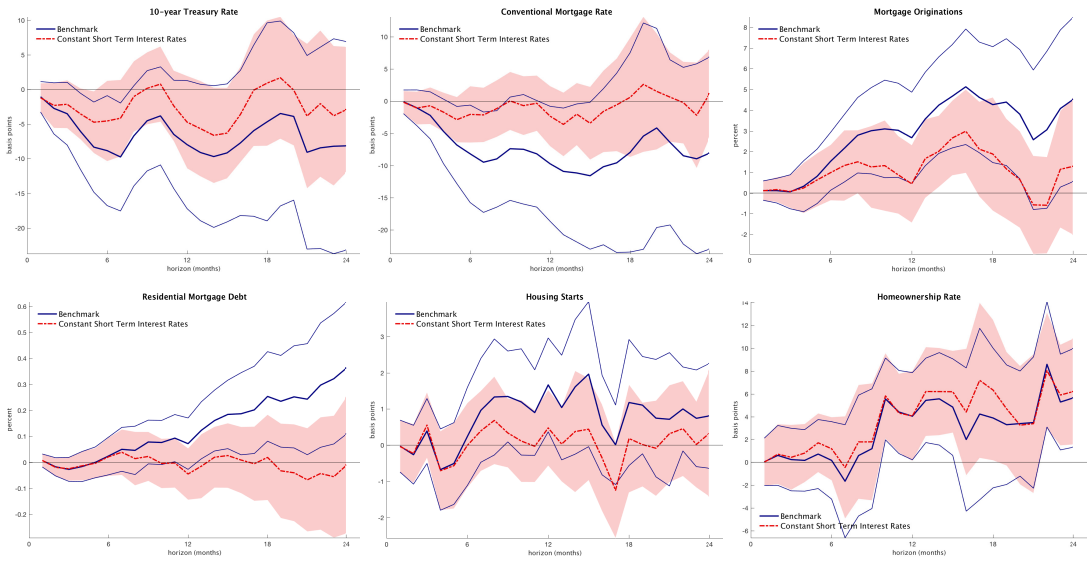

Figure 1.13: Shock to Anticipated Agency Purchases: Counterfactual with Constant Short-Term Rate

Notes: The figure shows responses to a one pp. increase in the expected future agency market share as in the benchmark of eq. (1.3), as well as those augmented with a sequence of monetary shocks such that the 3-month T-bill rate remains constant. Estimates are from local projections-IV regressions instrumenting agency commitments with the narrative policy indicator, and the 3-month T-bill rate with the Romer and Romer (2004) monetary policy shock measure, respectively. Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

seems particularly important for stimulating residential investment. Even with constant interest rates, however, purchases of mortgage assets continue to have statistically significant effects on mortgage lending. In addition, the path of short-term interest rates appears largely irrelevant for the increase in the homeownership rate that follows an expansion in agency purchases. In the appendix, we report results for the same counterfactual experiment when we use GSE excess returns shocks for identifying responses to anticipated agency purchases. The results indicate a smaller role for conventional monetary policy in explaining the drop in long-term interest rates or the positive effect on housing starts. Otherwise, the findings are comparable to those obtained using the narrative instrument in Figure 1.13.

1.8 Concluding Remarks

The postwar period witnessed a remarkable expansion in residential mortgage debt. During the same period, an increasing share has come to reside on what is ultimately the balance sheet of the federal government. In this paper, we provide evidence that government mortgage purchases influence the volume and cost of mortgage lending. In order to tackle reverse causality, we make use of a number of policy changes that have impacted the ability of government agencies to acquire mortgage debt. Using policy interventions that we classify as non-cyclically motivated to construct an instrumental variable for (news about) agency mortgage purchases, we find that an increase in these purchases stimulates mortgage originations and debt, and temporarily lowers mortgage rates. Consistent with the evidence in Di Maggio et al. (2016) regarding the effects of the QE interventions, we find that agency purchases have particularly large effects on refinancing activity. We also find a positive impact on housing starts and homeownership, and some indications of positive effects on house prices and consumption expenditures. An alternative identification strategy discussed in the appendix based on GSE excess returns innovations as an instrument for purchasing activity yields overall very similar results.

One important aspect of our findings is the apparent similarity and interaction between housing credit policies and conventional interest rate policy. We find that greater agency mortgage purchases lead to broad declines in short- and long-term interest rates. Our measure of non-cyclically motivated credit policy changes predicts the Romer and Romer (2004) monetary policy shock measure, and expansionary credit policy appears to be accommodated by monetary policy. In contrast, we find that credit policy adjusts in order to offset the

effects of monetary disturbances. It may therefore be necessary to account for credit policy to understand the effects of monetary policy. Agency purchase shocks have relatively larger effects on mortgage originations and refinancing activity than interest rate shocks, and influence homeownership regardless of the path of short-term interest rates. The quantitative effects of credit and monetary policy shocks on many other variables, including residential investment, are otherwise remarkably similar.

There are several interesting avenues for future research: Unlike theoretical or multivariate statistical models, our approach does not easily allow an assessment of the historical contribution of structural shocks without further assumptions. Future work can verify whether credit policy shocks are important causal factors in past housing or credit cycles, in particular during the most recent housing boom and bust.[31] Another interesting avenue for future research is to verify whether the macroeconomic impact of agency mortgage purchases has grown with the rise in the stock of mortgage debt, and whether it varies importantly with the broader financial conditions. Our results can be used to help evaluate the credit policy interventions in the recent financial crisis, the possible impact of unwinding the Fed's current mortgage holdings, or the various proposals for GSE reform. We have made no attempt at understanding more precisely the nature or implications of the credit frictions and transmission channels through which housing credit policies operate. Future work may apply similar cross-sectional identification strategies as Di Maggio et al. (2016), Rodnyansky and Darmouni (2018), or Chakraborty, Goldstein, and MacKinlay (2017) to other housing credit policy events documented in our narrative anal-

[31]The expansion of the GSE's market share from the early 1990s to mid-2004 was dramatic, but came to a grinding halt when, following revelations of accounting fraud, regulators imposed capital surcharges on Fannie and Freddie in the fall of 2004 and eventually portfolio caps in mid-2006.

ysis. Finally, it is possible to apply a similar analysis to assess the impact of government mortgage guarantees and securitization.

BIBLIOGRAPHY

Arcelus, Francisco and Allan H. Meltzer, "The Markets for Housing and Housing Services," *Journal of Money, Credit and Banking*, 5 (1973), 78–99.

Bassett, William F., Mary Beth Chosak, John C. Driscoll, and Egon Zakrajšek, "Changes in Bank Lending Standards and the Macroeconomy," *Journal of Monetary Economics*, 62 (2014), 23–40.

Bordo, Michael D. and Joseph G. Haubrich, "Credit Crises, Money and Contractions: An Historical View," *Journal of Monetary Economics*, 57 (2010), 1–18.

Boudoukh, Jacob, Matthew Richardson, Richard Stanton, and Robert F. Whitelaw, "Pricing Mortgage-Backed Securities in a Multifactor Interest Rate Environment: A Multivariate Density Estimation Approach," *The Review of Financial Studies*, 10 (1997), 405–446.

Chakraborty, Indraneel, Itay Goldstein, and Andrew MacKinlay, "Monetary Stimulus and Bank Lending," University of Miami manuscript, 2016.

Congressional Research Service, "A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003," Washington, D.C: U.S. Government Printing Office, 2004.

Cúrdia, Vasco and Michael Woodford, "The Central-Bank Balance Sheet as an Instrument of Monetary Policy," *Journal of Monetary Economics*, 58 (2011), 54–79.

Darmouni, Olivier and Alexander Rodnyansky, "The Effects of Quantitative Easing on Bank Lending Behavior," *Review of Financial Studies*, forthcoming 2017.

Davis, Morris A. and Jonathan Heathcote, "The Price and Quantity of Residential Land in the United States," *Journal of Monetary Economics*, 54 (2007), 2595–2620.

Di Maggio, Marco and Amir Kermani, "Credit-Induced Boom and Bust," forthcoming, *Review of Financial Studies*, 2016.

Di Maggio, Marco, Amir Kermani, and Christopher Palmer, "How Quantitative Easing Works: Evidence on the Refinancing Channel," Columbia Business School Research Paper No. 16-1, 2016.

Eckstein, Otto and Allen Sinai, "The Mechanisms of the Business Cycle in the Postwar Era", in The American Business Cycle: Continuity and Change, Robert J. Gordon, ed. (Chicago, IL: NBER and The University of Chicago Press, 1986).

Fama, Eugene F. and Kenneth R. French, "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics*, 33 (1993), 3–56.

Fieldhouse, Andrew and Karel Mertens, "A Narrative Analysis of Mortgage Asset Purchases by Federal Agencies," NBER Working Paper No. 23165, 2017.

Fisher, Jonas D.M. and Ryan Peters, "Using Stock Returns to Identify Government Spending Shocks," *The Economic Journal*, 120 (2010), 414–436.

Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian Sack, "The Financial Market Effects of the Federal Reserve's Large-Scale Asset Purchases," *International Journal of Central Banking*, 7 (2011), 3–43.

Gertler, Mark and Nobuhiro Kiyotaki, "Financial Intermediation and Credit Policy in Business Cycle Analysis," in Handbook of Monetary Economics, Vol-

ume 3A, Benjamin M. Friedman and Michael Woodford, eds. (San Diego, CA: North-Holland, 2010).

Gilchrist, Simon and Egon Zakrajšek, "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 102 (2012), 1692–1720.

Greenspan, Alan, "Government-Sponsored Enterprises," Remarks by Chairman Alan Greenspan to the Conference on Housing, Mortgage Finance, and the Macroeconomy, Federal Reserve Bank of Atlanta, Atlanta, Georgia, May 19, 2005.

González-Rivera, Gloria, "Linkages Between Secondary and Primary Markets for Mortgages," *The Journal of Fixed Income*, 11 (2001), 29–36.

Haltum, Renee and Robert Sharp, "The First Time the Fed Bought GSE Debt," Federal Reserve Bank of Richmond Economic Brief 14-04, 2014.

Hancock, Diana and Wayne Passmore, "Did the Federal Reserve's MBS Purchase Program Lower Mortgage Rates?," *Journal of Monetary Economics*, 58 (2011), 498–514.

———— , "How Does the Federal Reserve's Large-Scale Asset Purchases (LSAPs) Influence Mortgage-Backed Securities (MBS) Yields and U.S. Mortgage Rates?," *Real Estate Economics*, 43 (2015), 855–890.

Hanson, Samuel G., "Mortgage Convexity," *Journal of Financial Economics*, 113 (2014), 270–299.

Hendershott, Patric H. and Kevin E. Villani, "The Federally Sponsored Credit Agencies: Their Behavior and Impact," in Capital Markets and the Housing Sector: Perspectives on Financial Reform, Robert M. Buckley, John A. Tucillo, and Kevin Villani, eds. (Cambridge, MA: Ballinger Publishing Co., 1977).

Hendershott, Patric H. and Kevin E. Villani, "Residential Mortgage Markets and the Cost of Mortgage Funds," *Journal of the American Real Estate and Urban Economics Association*, 8 (1980), 50–76.

Hendershott, Patric H. and James D. Shilling, "The Impact of the Agencies on Conventional Fixed-Rate Mortgage Yields," *Journal of Real Estate Finance and Economics*, 2 (1989), 101-115.

Jaffee, Dwight M. and Kenneth T. Rosen, "Estimates of the Effectiveness of Stabilization Policies for the Mortgage and Housing Markets," *The Journal of Finance*, 33 (1978), 933-946.

Jordà, Òscar, "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, 95 (2005), 161–182.

Justiniano, Alejandro, Giorgio E. Primiceri, and Andrea Tambalotti, "Credit Supply and the Housing Boom," NBER Working Paper No. 20874, 2015.

Kaufman, Herbert M., "FNMA and the Housing Cycle: Its Recent Contribution and Its Future Role in a Deregulated Environment," in The Federal National Mortgage Association in a Changing Economic Environment, Supplement to a Report by the Comptroller General of the United States. (Washington, D.C.: U.S. Government Accountability Office, 1985).

Krishnamurthy, Arvind and Annette Vissing-Jørgensen, "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy," *Brookings Papers on Economic Activity*, 2 (2011), 215–265.

Leamer, Edward E., "Housing IS the Business Cycle," NBER Working Paper No. 13428, 2007.

Lehnert, Andreas, Wayne Passmore, and Shane M. Sherlund, "GSEs, Mortgage Rates, and Secondary Market Activities," *Journal of Real Estate Finance and Economics*, 36 (2008), 343-363.

Malkhozov, Aytek, Philippe Mueller, Andrea Vedolin, and Gyuri Venter, "Mortgage Risk and the Yield Curve," *The Review of Financial Studies*, 29 (2016), 1220–1253.

Meltzer, Allan H., "Credit Availability and Economic Decisions: Some Evidence from the Mortgage and Housing Markets," *The Journal of Finance*, 29 (1974), 763–777.

Mertens, Karel and Morten O. Ravn, "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Review*, 103 (2013), 1212–1247.

Mian, Atif and Amir Sufi, "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," *Quarterly Journal of Economics*, 124 (2009), 1449–1496.

Mian, Atif, Amir Sufi, and Emil Verner, "How Do Credit Supply Shocks Affect the Real Economy? Evidence from the United States in the 1980s," Princeton University manuscript, 2017.

Naranjo, Andy and Alden Toevs, "The Effects of Purchases of Mortgages and Securitization by Government Sponsored Enterprises on Mortgage Yield Spreads and Volatility," *Journal of Real Estate Finance and Economics*, 25 (2002), 173–195.

Newey, Whitney K. and Kenneth D. West, "A Simple, Positive Semi-

Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55 (1987), 703–708.

Owens, Raymond E. and Stacey L. Schreft, "Identifying Credit Crunches," Federal Reserve Bank of Richmond Working Paper 93-02, 1993.

Patrabansh, Saty, William M. Doerner, and Samuel Asin, "The Effect of Monetary Policy on Mortgage Rates," FHFA Working Paper 14-2, 2014.

Passmore, S. Wayne, "The GSE Implicit Subsidy and the Value of Government Ambiguity," *Real Estate Economics*, 33 (2005).

Peek, Joe, Eric S. Rosengren, and Geoffrey M.B. Tootell, "Identifying the Macroeconomic Effects of Loan Supply Shocks," *Journal of Money, Credit and Banking*, 35 (2003), 931–946.

Perli, Roberto, and Brian P. Sack, "Does Mortgage Hedging Amplify Movements in Long-Term Interest Rates?," *The Journal of Fixed Income*, 13 (2003), 7–17.

Ramey, Valerie A., "Identifying Government Spending Shocks: It's All in the Timing," *Quarterly Journal of Economics*, 126 (2011), 1–50.

———— , "Macroeconomic Shocks and Their Propagation," in Handbook of Macroeconomics, Volume 2A, John B. Taylor and Herald Uhlig, eds. (San Diego, CA: North-Holland, 2016).

Ramey, Valerie A. and Sarah Zubairy, "Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data," forthcoming Journal of Political Economy, 2017.

Romer, Christina D. and David H. Romer, "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," in NBER Macroeconomics Annual 1989, Volume 4, Olivier Jean Blanchard and Stanley Fischer, eds. (Cambridge, MA: The MIT Press, 1989).

———— , "A New Measure of Monetary Shocks: Derivation and Implications," *American Economic Review*, 94 (2004), 1055–1084.

———— , "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review*, 100 (2010), 763–801.

Shiller, Robert J., Irrational Exuberance, 3rd ed. (Princeton, NJ: Princeton University Press, 2015).

Shumway, R.H. and D.S. Stoffer, "An Approach to Time Series Smoothing and Forecasting Using the EM Algorithm," *Journal of Time Series Analysis*, 3 (1982), 253–264.

Smith, Lawrence B., Kenneth T. Rosen, and George Fallis, "Recent Developments in Economic Models of Housing Markets," *Journal of Economic Literature*, 26 (1988), 29–64.

Stock, James H. and Mark W. Watson, "Identification and Estimation of Dynamic Causal Effects in Macroeconomics", Harvard University manuscript, 2017.

Stroebel, Johannes and John B. Taylor, "Estimated Impact of the Federal Reserve's Mortgage-Backed Securities Purchase Program," *International Journal of Central Banking*, 8 (2012), 1–42.

Wieland, Johannes F. and Mu-Jeung Yang, "Financial Dampening," University of California, San Diego manuscript, 2016.

CHAPTER 2

CROWD-OUT EFFECTS OF U.S. HOUSING CREDIT POLICY

Andrew J. Fieldhouse

Abstract: Credit policies can expand targeted lending volumes by subsidizing private credit risks, and an expansion in targeted lending may crowd out other loans. I document that U.S. housing credit policies subsidizing an expansion in residential mortgage lending unintentionally crowd out commercial lending and related real activity. I use a long history of regulatory changes for exogenous variation in the mortgage purchases of Fannie Mae and Freddie Mac, government-sponsored enterprises that subsidize mortgage borrowing. Regulatory shocks to subsidized mortgage purchases crowd in private home mortgage lending while unintentionally crowding out commercial mortgages and loans. U.S. housing credit policies similarly reallocate construction activity toward housing and away from commercial real estate, negating any intended stimulus to aggregate construction or employment. I contribute evidence that the transmission of such mortgage purchases operates through a mortgage origination channel and a safe asset supply channel, which induce significant reallocations in bank lending. I explore implications for unwinding the Federal Reserve's mortgage holdings and eventual reforms to Fannie and Freddie.

2.1 Introduction

Congress has heavily intervened in U.S. mortgage markets ever since the Great Depression, when federal housing credit policies were first deployed to resuscitate housing and mortgage markets. Congress chartered federal agencies and government-sponsored enterprises (GSEs) to promote access to mortgage credit by purchasing or guaranteeing mortgages. Since the onset of the Great Recession the Federal Reserve has conducted its own form of housing credit policy aimed at reducing the cost and increasing the availability of mortgage credit: large-scale purchases of government agency mortgage-backed securities (MBS). Whereas conventional monetary policy targets a term structure of risk-free interest rates, credit policy aims to alter the allocation of credit by absorbing or subsidizing lending risks. Housing credit policies can, in principle, allocate resources toward housing by subsidizing a reduction in mortgage risk premia. By subsidizing an expansion in mortgage borrowing, housing credit policies may unintentionally crowd out lending to other sectors, potentially diminishing the aggregate stimulus policymakers often intend from such credit policies.

I empirically test whether housing credit policies reallocate credit away from other sectors, using a long history of regulatory shocks for exogenous variation in GSE mortgage purchases. Primary sources and budget scorekeeping rules suggest that congressional policymakers view housing credit policies as a free lunch, ignoring possible tradeoffs predicted by the literature on credit policies. If the supply of credit is imperfectly elastic, subsidizing an expansion in targeted borrowing crowds out the supply of loanable funds available for intermediation of other loans, as does issuing debt to finance credit policies. In theoretical models of federal credit policies the degree of crowd out hinges significantly on how

the supply of credit is parameterized (Gale, 1991; Lucas, 2016). My empirical strategy avoids taking a stance on the elasticity of credit supply or the precise nature of credit frictions, and can easily speak to real-financial linkages. I find that subsidizing an expansion in home mortgage lending crowds out commercial real estate and business lending. Likewise, GSE purchases stimulate single-family housing investment and crowd out commercial real estate construction, providing no net stimulus to aggregate construction spending or employment. To my knowledge, this is the first paper to document that U.S. housing credit policies inadvertently crowd out commercial lending and related real activity.

My empirical strategy exploits a long history of regulatory policy changes affecting the mortgage holdings of government agencies as documented by Fieldhouse and Mertens (2017), similar to the approaches of Friedman and Schwartz (1963a), Romer and Romer (1989, 2010), and Ramey (2011) in parsing historical records for policy variation. I instrument GSE mortgage purchases with regulatory policy changes classified as unrelated to economic conditions—essentially exogenous shocks to the supply of subsidized mortgage credit. The identification strategy is similar to that employed by Fieldhouse, Mertens, and Ravn (2018) to test whether mortgage purchases of government agencies advance stated policy objectives or interact with conventional monetary policy. I estimate impulse responses of credit and construction flows to GSE regulatory shocks in a local projection–instrumental variable (LP-IV) regression framework—a macroeconometric analog of microeconometric instrumental variable regressions, using a time series of documented and quantified GSE regulatory policy shocks as the instrument.

More specifically, I document credit reallocations ensuing from the mortgage

purchases of the Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac), the GSEs chartered by Congress to support a secondary market for residential mortgages.[1] The secondary mortgage market is intended to increase the availability and liquidity of mortgages, and is periodically used to try to promote homeownership or stimulate economic activity. Fannie and Freddie are barred from originating loans themselves, and can only purchase mortgages originated in the primary market. Purchased mortgages are either held as investments or pooled into guaranteed MBS, much of which the GSEs also retain. In practice, the mortgage purchases of Fannie and Freddie absorb credit, prepayment, and interest rate risk from the private sector, and a mortgage subsidy arises from an implicit government guarantee on agency securities.[2] The GSEs' mortgage holdings came to comprise a significant source of subsidized mortgage funding, with Fannie and Freddie owning as much as 20% of residential mortgage debt in recent decades.

In the absence of subsidies and financial frictions, theory suggests government mortgage purchases should affect neither mortgage lending nor other credit markets: such purchases would be neutral in frictionless models of perfect competition, simply crowding out private mortgage holdings. By introducing subsidies, credit policies can expand targeted lending volumes in otherwise perfectly competitive markets, as in the model of Lucas (2016). Fieldhouse, Mertens, and Ravn (2018) document that government agency mortgage purchases advance a number of intended policy objectives, notably boosting mortgage lending, housing starts, and homeownership rates. Agency pur-

[1]With an abuse of terminology, I use "GSE" to refer exclusively to Fannie and Freddie. The Federal Home Loan Bank System is also a housing government-sponsored enterprise, instead chartered to provide wholesale funding to mortgage lenders.

[2]Passmore, Sherlund, and Burgess (2005), Passmore (2005), and CBO (2012) estimate GSE subsidies and funding advantages.

chases both increase mortgage lending and reduce mortgage rates, consistent with purchases subsidizing mortgage borrowing. The non-neutrality of agency purchases for mortgage lending, however, sheds no light on whether purchases might inadvertently crowd out other lending, which hinges on credit frictions and credit supply elasticities as opposed to subsidies.

Secondary market demand for newly originated residential mortgages distorts incentives in the primary market by generating risk-free fee income and conferring an option on new mortgage originations. If primary market lenders are constrained, the transmission of GSE purchases may operate through an origination channel, in which diverting resources toward a profitable opportunity to originate mortgages reduces other lending. There are extensive theoretical and empirical underpinnings for bank lending being constrained by information frictions in funding markets or regulatory requirements.[3] Beyond balance sheet constraints, banks may face origination capacity constraints: allocating loan officers or other screening and underwriting resources to originate residential mortgages may reduce other originations if such resources are fixed in the short run.[4] By issuing bonds or MBS to finance their purchases, the GSEs may compete with banks for funding, raising banks' external cost of funds and tightening balance sheet constraints, thereby reducing lending. I test whether subsidized GSE mortgage purchases induce a reallocation of credit away from other sectors, as would be driven by funding or origination capacity constraints in the primary mortgage market.

Expansionary housing credit policy shocks increase both GSE mortgage

[3]See, for instance, Bernanke and Blinder (1992), Kashyap and Stein (1994, 1995, 2000), and Gertler and Kiyotaki (2010).

[4]Sharpe and Sherlund (2016) and Chakraborty, Goldstein, and MacKinlay (2017, 2018) find evidence of such a tradeoff.

holdings and the supply of agency bonds and MBS, which are considered safe assets that carry a premium for their money-like use as collateral (Gorton, Lewellen, and Metrick, 2012). The safety premium on newly issued agency securities can only directly subsidize residential mortgages, as the GSEs cannot legally arbitrage across other asset classes. Increased GSE demand lowers mortgage rates and induces primary market lenders to originate more residential mortgages; there is also a substitution away from nonresidential mortgage originations, indicative of origination capacity constraints. In response to GSE regulatory shocks, commercial banks substitute away from nonresidential loans and toward holdings of safe government agency securities. Consistent with intermediaries being balance sheet constrained, there is no significant response of commercial banks' aggregate assets, only portfolio rebalancing effects across assets. Beyond operating through a subsidy channel, lending responses to GSE regulatory shocks suggest the transmission of housing credit policies operates through a mortgage origination channel and a safe asset supply channel, inducing significant reallocations in lending.

While GSE demand for mortgages stimulates lending and investment for single-family housing, general equilibrium effects appear to negate any intended aggregate stimulus. Private holdings of home mortgages see a significant rise of 25 to 50 cents in response to a one-dollar shock to GSE purchases over two to four years. Secondary market purchase shocks additionally induce a persistent, significant decline in private holdings of multifamily and commercial mortgages of roughly 20 to 30 cents per dollar of GSE purchases, while commercial and industrial (C&I) loan volumes persistently fall 15 to 25 cents. GSE purchase shocks spur similarly divergent responses for real activity, inducing a persistent rise in single-family home construction spending and an

equivalent reduction in commercial real estate construction. There is no significant response of total construction spending, construction sector employment, or total employment.

Lastly, I explore implications of the crowd-out effects of U.S. housing credit policy for the shrinking federal role in financing mortgages, as well as eventual reforms to Fannie and Freddie. Congress is still trying to resolve the fate of the GSEs more than a decade after taking them into conservatorship. Federal regulators have significantly reduced the GSEs' mortgage holdings, and the Fed began unwinding its holdings of mortgages in 2017. Consequently the share of residential mortgage debt funded by federal agencies is slated to fall from over 25% to roughly 5%—a sizable shock to the supply of subsidized mortgage credit. My findings are particularly relevant to the ongoing reduction of the Fed's mortgage holdings. The high-frequency and cross-sectional event study designs used to analyze the Fed's large-scale asset purchases cannot speak to aggregate effects of reducing the Fed's MBS holdings near the peak of the business cycle. There are, however, significant similarities between the mortgage purchases of the Fed and the GSEs; both purchase newly originated residential mortgages in a forward contract market, similarly distorting origination incentives. I find evidence of GSE purchases operating through a mortgage origination channel similar to that documented for the Fed's MBS purchases.[5] My estimates of aggregate crowd out from exogenous GSE purchases bode well for unwinding the Fed's MBS holdings: a reallocation of credit and construction activity toward commercial real estate may offset adverse effects for single-family mortgage lending and housing investment.

[5]Fuster and Willen (2010); Di Maggio, Kermani, and Palmer (2016); Chakraborty, Goldstein, and MacKinlay (2017); and Rodnyansky and Darmouni (2018) find evidence of the Fed's MBS purchases operating through a mortgage origination channel.

2.2 U.S. Housing Credit Policy: Theory, Practice, and Evidence

The federal government effectively operates a sizable, largely off-balance sheet national bank to try to advance numerous policy objectives. Credit policies refer to the government absorbing risks associated with lending to the private sector, typically through direct government lending, loan guarantees, or government-sponsored secondary markets.[6] Credit policies aim to expand a targeted form of lending through subsidies. Relative to direct expenditures, the costs of credit programs are more stochastic, less transparent, and broadly underestimated by federal budget rules, contributing to the proliferation of credit policies.[7] Federal credit programs span mortgage credit, farm credit, student loans, and small business loans. As of fiscal year 2010, the federal government had $2.3 trillion in outstanding direct or guaranteed loans, and, including liabilities of Fannie and Freddie, was exposed to credit risk on a total of $8 trillion in assets (Elliott, 2011); for scale, federal non-interest spending totaled $3.3 trillion and debt held by the public totaled $9 trillion for the year.[8]

Congress heavily intervenes in mortgage markets via credit policies. Government-sponsored secondary mortgage markets and the prominence of long-term, fixed-rate mortgages in the U.S. are anomalies among advanced economies, both being interrelated legacies of Depression-era policy interventions. Prior to the Depression, U.S. mortgages were structured as non-amortizing loans with short maturities and balloon repayments. This financing system imploded amid the widespread bank failures and deflation of the

[6] Beyond housing, Congress sponsored secondary markets for agricultural loans (Farmer Mac) and student loans (Sallie Mae).

[7] See Lucas (2016) for an overview of how federal budget rules underestimate credit subsidies.

[8] Housing programs accounted for 55% of direct or guaranteed loans and 81% of total obligations carrying federal credit risk.

Depression. Against this backdrop, Congress launched a new class of long-term, fixed-rate, self-amortizing mortgages, and government agencies began guaranteeing loans for qualifying borrowers. Even absent credit risk, fixed-rate mortgages pose dual interest rate risks, as lenders face shrinking loan spreads if interest rates rise and refinancing prepayments if interest rates fall. Liquidity risk arises from funding illiquid, long-term mortgages with volatile, short-term deposits. Depository institutions were initially reluctant to hold long-term, government-insured mortgages, prompting Congress to charter secondary markets to increase mortgage liquidity. Congress's use of secondary markets evolved, aiming to stabilize mortgage credit across the country and business cycle, periodically boost residential construction, and promote homeownership rates—all while supporting an enduring policy preference for long-term, fixed-rate mortgages.[9]

My overarching research question is whether U.S. housing credit policies that subsidize residential mortgage borrowing inadvertently reallocate credit away from other non-targeted lending. Figure 2.1 sketches out the rough structure of U.S. mortgage markets to elucidate how housing credit policies could be displacing commercial lending. In chartering Fannie and Freddie to support a secondary market for residential mortgages conforming to certain underwriting standards, or "conforming mortgages," Congress barred the GSEs from originating loans themselves or investing in non-mortgage assets.[10] The GSEs purchase conforming residential mortgages from primary market lenders

[9]See Appendix B for a more detailed history of the evolution of U.S. federal housing credit policy.

[10]The GSEs can only purchase residential mortgages conforming to underwriting standards set by their regulators, notably a loan limit and loan-to-value ratio. Mortgages above the conforming loan limit are "jumbo" mortgages, whereas Federal Housing Administration- or Veterans Administration-guaranteed loans have lower loan limits and downpayment requirements. Residential mortgages are for single-family and multifamily residences, excluding commercial and farm mortgages.

who originate and service loans—primarily commercial banks, thrift banks, and mortgage companies. Broadly speaking, primary market lenders originate conforming mortgages they can sell to secondary market, and additionally originate a host of ineligible loans (depicted in blue), notably non-conforming residential mortgages, commercial mortgages, commercial and industrial loans, and consumer loans.[11]

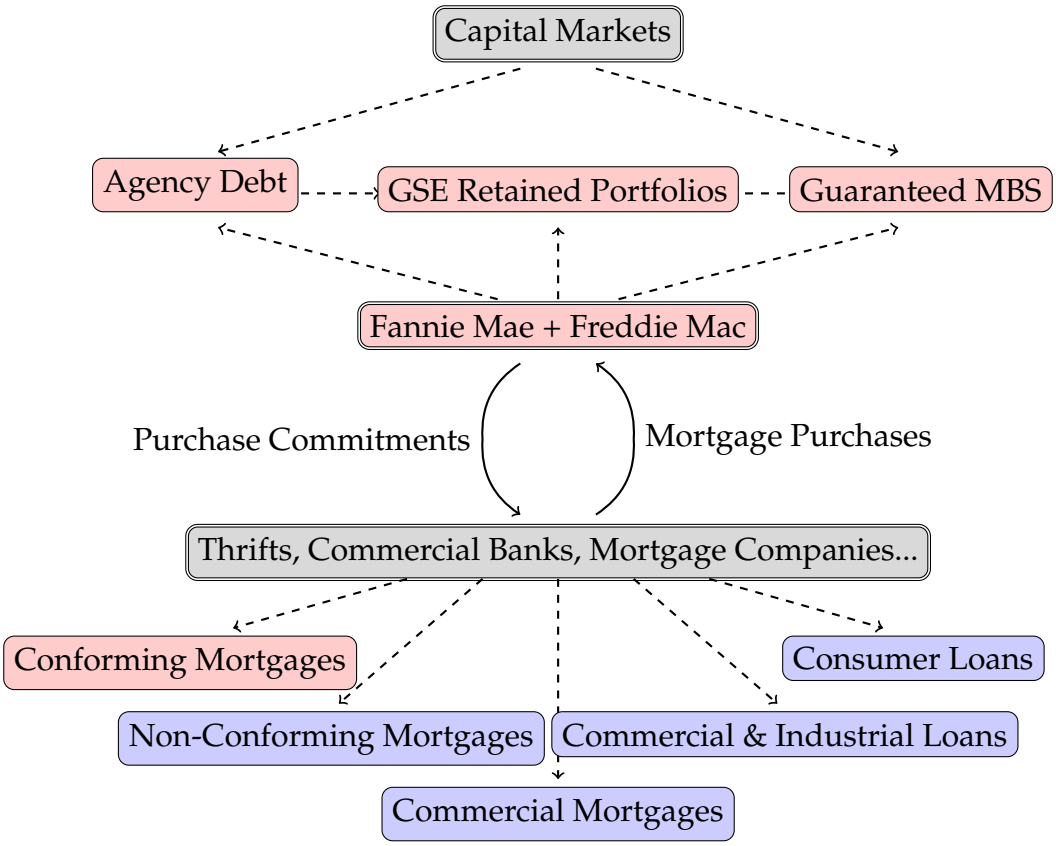

Figure 2.1. Structure of the U.S. Primary and Secondary Mortgage Markets

Mortgages purchased by the GSEs are held as retained portfolio investments, or are pooled into agency MBS that Fannie and Freddie guarantee in exchange

[11]Before the 1970s, Fannie only purchased Federal Housing Administration- and Veterans Administration-guaranteed loans. In recent years, the GSEs have been allowed to purchase non-conforming subprime and Alt-A mortgages if supplemented with private mortgage insurance.

for fees.[12] Fannie and Freddie hold agency MBS as investments and have a sizable off-balance sheet guarantee book of their MBS held by third parties. GSE mortgage purchases are financed by issuing agency bonds or MBS, both considered safe assets because of an implicit government guarantee.[13] Safe assets carry a premium, as they play a money-like role in facilitating commerce through their use as information-insensitive collateral (Gorton, Lewellen, and Metrick, 2012). The safety premium on agency securities can only be passed on to subsidize residential mortgages because the GSEs are prohibited from arbitraging across asset classes. In practice, the GSEs are able to intermediate funds for residential mortgages at lower cost than private counter-parties because of the safety premium on agency securities, or, framed differently, because credit frictions raise banks' external cost of funds above the risk-free rate afforded the GSEs. Passmore, Sherlund, and Burgess (2005) estimate the GSEs' funding advantage to be roughly 40 basis points over long-term AAA/AA financial corporate debt, some of which is passed on to lower mortgage rates for borrowers. Congressional Budget Office estimates similarly imply an annualized subsidy rate of roughly 40 basis points for mortgages purchased by the GSEs (Lucas, 2016).

In the absence of subsidies or credit frictions, credit policies are neutral in models of perfect competition, with government loans or purchases perfectly crowding out private lending. Competitive banks will price mortgages at a premium over risk-free interest rates that compensates for expected default and interest rate risk, generating a perfectly elastic supply of mortgage credit. The secondary mortgage market can, however, influence credit allocations by reducing

[12] "Agency MBS" refers to issues of Fannie, Freddie, and Ginnie, with timely payment guaranteed by the issuing agency.

[13] Many institutional investors financing agency securities cannot purchase whole mortgages, such as pension funds or the Fed.

mortgage risk premia over risk-free interest rates. Directly funding mortgages at a subsidized rate will expand the volume of mortgage borrowing, moving households down along their demand curve. Reducing mortgage risk premia by absorbing default risk on privately held loans is isomorphic to subsidized direct lending, provided that government guarantees are underpriced, as is the case in the United States (CBO, 2012; Lucas, 2016).[14] If the supply of credit is unconstrained, subsidizing a downward shift in the supply of mortgage credit will have no effect on the markets for other loans, which will remain competitively supplied at actuarily fair premia over risk-free interest rates.

If federal credit subsidies expand the volume of residential mortgage borrowing, a tradeoff with respect to other lending may arise from a finite supply of credit or frictions constraining bank lending. Gale (1991) demonstrates that credit subsidies will increase targeted lending and crowd out non-targeted lending in a model of credit markets with information frictions, similar to Stiglitz and Weiss (1981), but modified with a partially inelastic supply of funds. Inducing an expansion in targeted borrowing can crowd out the supply of savings available for intermediation of non-targeted loans, as does issuing government debt to finance credit policies; see Gale (1991). Subsidizing mortgages will similarly expand the volume of mortgage borrowing and reduce mortgage spreads if credit supply is partially inelastic. But through the market clearing condition for aggregate lending, the expansion in mortgage lending may additionally cause a contraction in the supply of commercial loans, decreasing borrowing and increasing spreads on commercial loans. In partial equilibrium models of credit policies the degree of crowd out is highly sensitive to how the supply of credit is parameterized. My identification strategy avoids imposing

[14]GSE MBS guarantees have carried a credit subsidy by underpricing both guarantee fees and the cost of capital.

such a stance: the degree of crowd out is empirically testable using exogenous variation in the supply of subsidized mortgage credit.

Credit frictions could similarly generate a tradeoff between a subsidized expansion in residential mortgage lending and a contraction in other lending. Banks are typically thought to operate a screening technology enabling them to produce loans from deposits (or wholesale funding) and loan officers. There is abundant theoretical and empirical support for this intermediation role being constrained by information or agency frictions, regulatory requirements, or loan origination capacity constraints. Agency or contracting problems between borrowers and lenders may give rise to endogenous balance sheet constraints, limiting aggregate bank lending; see Bernanke and Gertler (1989), Kiyotaki and Moore (1997), and Gertler and Kiyotaki (2010).[15] The literature on the bank lending channel of monetary policy is relatedly premised on banks being constrained by reserve requirements because they cannot frictionlessly raise uninsured funds.[16] Such balance sheet constraints would necessitate a tradeoff between a subsidized expansion in mortgage lending and non-targeted lending volumes. GSE purchase shocks distort primary market originations incentives toward one class of loans by generating risk-free fee income, potentially crowding out other originations.[17] By incentivizing new mortgages originations, GSE

[15]Gertler and Kiyotaki (2010) develop a model of contracting frictions in which credit policies can facilitate intermediation. With frictions in the retail or wholesale funding markets, banks become balance sheet constrained and arbitrage breaks down. Credit policies expand total intermediation when banks are constrained, but would otherwise perfectly displace private lending.

[16]See, for instance, Bernanke and Blinder (1988), and Kashyap and Stein (1994, 1995), and Stein (1998). Beginning with Bernanke and Blinder (1992), a body of empirical work finds evidence of monetary transmission shifting bank loan supply schedules, particularly for banks with less liquid assets (Kashyap and Stein, 2000). Iacoviello and Minetti (2008) and Black, Hancock, and Passmore (2010) find evidence of a bank lending channel of monetary policy operating through mortgage lending.

[17]Non-interest fee income has become a sizable source of earnings for financial services institutions, often comparable to net interest earnings for large banks. In 2016 the five largest mortgage originators by volume were Quicken Loans, Wells Fargo Bank, JP Morgan Chase Bank, Bank of America, and Freedom Mortgage Corporation (Bhutta, Laufer, and Ringo, 2018). Over

purchases may divert loan officer effort or other underwriting resources away from less profitable origination activity. Sharpe and Sherlund (2016) document significant mortgage processing and origination capacity constraints binding during refinancing booms, inducing a substitution away from more resource-intensive underwriting activity. Loan officers are commissioned by origination volume, so their incentives are aligned with prioritizing low-effort, high-volume originations.

Consistent with binding balance sheet or origination capacity constraints, a smaller recent literature documents evidence of shocks to mortgage originations crowding out non-mortgage lending. Chakraborty, Goldstein, and MacKinlay (2018) find cross-sectional evidence of regional home-price booms inducing an expansion in home mortgage lending and reducing C&I lending, indicative of constraints on bank intermediation. In a similar vein, Chakraborty, Goldstein, and MacKinlay (2017) find cross-sectional evidence of the Fed's MBS purchases inducing a tradeoff in loan originations: banks with greater exposure to the Fed's MBS purchases see a relative increase in mortgage originations and a relative decrease in C&I loan growth during QE1 and QE3.[18] The authors attribute the unintended crowd out of non-targeted lending to a mortgage origination channel.[19] The crowd-out effects are larger for more financially constrained banks, consistent with balance sheet constraints contributing to a reallocation of credit when demand for mortgage originations increases. The transmission

2015–2017, mortgage banking income accounted for 20–20% of net income for Wells Fargo, 7–10% of net income for JP Morgan Chase, and 1–15% of net income for Bank of America. Quicken Loans and Freedom Mortgage Corporation are mortgage companies. Mortgage origination fees and servicing fees or rights are the predominant sources of income for mortgage companies.

[18]No such effect was found when only Treasuries were purchases during QE2, suggesting a key role for mortgage originations.

[19]Fuster and Willen (2010); Di Maggio, Kermani, and Palmer (2016); and Rodnyansky and Darmouni (2018) find complimentary evidence of the Fed's MBS purchases increasing conforming mortgage originations and refinancing activity in particular.

of GSE demand for newly originated mortgages should, in principle, operate through a similar mortgage origination channel.

Rather than purchasing seasoned mortgages off of bank balance sheets, the GSEs sell advanced commitments to purchase up to a set volume of newly originated loans at pre-specified prices. The market structure of the GSEs committing to purchase mortgages delivered at a later date, if exercised, confers an option on new qualifying originations, altering adverse selection issues in mortgage lending. Banks may originate new loans in excess of anticipated sales to the secondary market, knowing that they can learn about borrower characteristics up to the option's expiration and deliver lemons while cream-skimming choice loans for their own holdings; such adverse selection issues are well documented in mortgage delivery to secondary markets (Vickery and Wright, 2013). The Federal Reserve purchases pools of newly originated conforming mortgages (i.e., agency MBS) through a similar forward contract market as the GSEs, likewise distorting marginal origination incentives. Chakraborty, Goldstein, and MacKinlay (2017) argue that this market structure for the Fed's MBS purchases gives rise to a mortgage origination channel and crowd out of C&I loans; again, the transmission of GSE demand for newly originated mortgages should operate similarly.

Fieldhouse, Mertens, and Ravn (2018) use the Fieldhouse and Mertens (2017) narrative history of regulatory policy shocks to test whether agency mortgage purchases advance stated policy objectives. As intended by policymakers, purchases induce statistically significant increases in mortgage lending, housing starts, and the homeownership rate.[20] The authors document that shocks to

[20]Bachasy, Kimz, and Yannelis (2018) find complementary empirical evidence that small business lending is highly responsive to changes in subsidized Small Business Administration loan guarantees, another form of U.S. credit policy.

mortgage purchases yield a significant decline in mortgage rates, consistent with purchases subsidizing borrowing. Non-neutrality of government agency purchases for mortgage lending, however, does not inform whether purchases would additionally reallocate credit from other lending, which depends on the supply of credit and intermediation frictions. I employ a similar identification strategy as Fieldhouse, Mertens, and Ravn (2018) to test whether GSE purchases unintentionally reallocate credit away from other sectors by subsidizing an expansion of mortgage lending. Housing credit policies are often deployed to try to boost construction activity or employment—as the Fed's MBS purchases intended—but crowd out of non-targeted lending could undermine their use as a stabilization policy. More broadly, primary sources suggest congressional policymakers neglect potential opportunity costs of housing credit subsidies, notably inefficient distortions to lending and real activity, related fiscal costs, and horizontal inequities. Related distortions to credit markets and real activity would be an important consideration ahead of pending reforms to U.S. secondary mortgage markets.

2.3 Identification Strategy and Main Regression Specifications

In estimating the response of economic activity to GSE purchases, the econometrician must be concerned with two sources of reverse causation. First, GSE purchases respond endogenously to mortgage market conditions, as mandated by their public charters and reinforced by profit motives. For instance, the GSEs may increase their purchases in response to rising mortgage spreads during recessions. Second, policymakers respond endogenously to distress in housing and mortgage markets, often pushing housing credit agencies to expand

purchases during recessions. Many common macroeconometric identification strategies, such as imposing timing restrictions in structural vector autoregressions (SVARs), cannot credibly deal with policy endogeneity and profit motives related to quickly responding financial variables. An alternative empirical strategy circumventing such pitfalls is the narrative approach to identification from observed policy variation.

My empirical strategy exploits a long narrative history of observed regulatory changes affecting GSE mortgage holdings to test whether subsidized mortgage purchases crowd out commercial lending and non-residential construction. In exchange for upholding their public missions, Congress conferred favorable regulatory treatment upon the GSEs, with distinct (often weaker) oversight than for other financial institutions; ad hoc regulatory oversight, in turn, generated a fair degree of policy variation affecting the mortgage holdings of Fannie and Freddie. Instrumenting actual purchases with exogenous regulatory policy shocks circumvents the GSEs' routine response to credit market conditions. Restricting attention to regulatory policy shocks classified as not cyclically motivated is intended to control for bias from policy endogeneity.

I test the responses of credit and construction flows to secondary market purchase shocks in two-stage least squares (2SLS) regressions. In the first stage, I use regulatory policy shocks that are classified as not cyclically motivated as instrumental variables for actual GSE purchases, addressing measurement error in the quantification of policy events. The benchmark regression specification is a LP-IV framework, similar to how Ramey and Zubairy (2017) estimate government spending multipliers and Fieldhouse, Mertens, and Ravn (2018) estimate credit multipliers. The regression framework yields easily interpreted credit

and construction multipliers, which represent the dollar response of lending or construction volumes to a one-dollar increase in GSE mortgage purchases, both cumulated over varying horizons. Dollar-denominated impulse responses are particularly well suited for analyzing the absolute magnitude of credit or construction reallocations.[21] Moreover, the LP-IV framework is appealing because it flexibly handles news shocks, policy implementation lags, and nonlinearities in impulse response functions, which are less easily accommodated in SVAR-IV frameworks; see Jordà (2005), Ramey (2016a), and Stock and Watson (2018).[22]

2.3.1 Narrative Instruments for Subsidized Supply of Mortgage Credit

I use the Fieldhouse and Mertens (2017) narrative record for exogenous variation in the mortgage purchases of Fannie and Freddie to test whether GSE purchases unintentionally crowd out commercial lending and construction activity.[23] The narrative approach to causal inference is based on the preliminary identification of observable shocks by parsing the historical record, as opposed to backing out shocks from latent variables with statistical techniques or modeling assumptions. Narrative analyses generate a time series of events for which the magnitude, pertinent timing, and exogeneity of the instruments are chronicled on an event-by-event basis. The narrative approach was pioneered by Friedman and Schwartz (1963a) in their canonical study of U.S. monetary history. Beyond monetary shocks, narrative analyses have subsequently been used

[21] Impulse responses measured in percentage deviations for time series in varied levels would preclude such comparisons.

[22] Nonlinearities may arise from lag times or asymmetric responses to contractionary versus expansionary regulatory changes.

[23] The narrative analysis is available at `http://www.nber.org/papers/w23165`.

to identify tax policy shocks, military spending shocks, and oil supply shocks.[24] While narrative analyses can yield a source of as-if randomness for causal identification, they requires a depth of institutional knowledge, availability of relevant primary sources, and sufficient historical identifying variation.

To identify exogenous variation in government purchases of mortgage debt, Fieldhouse and Mertens (2017) undertake a narrative analysis identifying and quantifying regulatory changes affecting the mortgage holdings of Fannie Mae, Freddie Mac, Ginnie Mae, the Fed, and Treasury.[25] Regulatory policy events identified and classified as not cyclically motivated are intended as instrumental variables for government agency purchases of mortgage debt. The narrative record is constructed from a close reading of primary source documents produced by congressional committees, government agencies, and federal regulators to track the policy histories of agencies purchasing mortgage debt. It proceeds in five steps: (1) identifying significant policy changes expected to affect agency portfolios, (2) quantifying a projected dollar effect of each regulatory change on the GSEs' retained mortgage holdings, (3) pinpointing the timing of each policy's news first becoming anticipated, (4) using primary sources to classify each policy as either cyclically or not cyclically motivated, and (5) restricting the sample for consistent use as instruments.

Policies for Fannie and Freddie are identified by chronologically tracing the

[24]Narrative analyses have documented monetary shocks (Friedman and Schwartz, 1963a,b; Romer and Romer, 1989, 2004; Cloyne and Hürtgen, 2016), tax shocks (Romer and Romer, 2010; Mertens and Ravn, 2013; Cloyne, 2013), military spending shocks (Ramey and Shapiro, 1998; Ramey, 2011, 2016b; Ramey and Zubairy, 2017), and oil shocks (Hamilton, 1983; Kilian, 2008).

[25]Ginnie Mae is a government-owned corporation, split from Fannie in 1968, that guarantees pools of government-insured mortgages. Congress largely directed Ginnie to purchase difficult-to-market classes of FHA/VA loans before ending its purchase program in the early 1980s. I restrict attention to Fannie and Freddie, as results for the GSEs are more relevant to current policy.

legislative history of the GSEs and related regulatory rulings.[26] Ex ante balance sheet data, estimates of regulators, or projections of financial analysts are used to quantify a projected dollar change in the GSE mortgage holdings over the first year of a policy taking effect. Policymakers tend to be quite explicit about cyclical motivations, such as boosting construction employment during a recession. The not cyclically motivated polices used for identification tend to be driven by some combination of improving budgetary optics, clarifying prior legislative intent, pushing the GSEs toward privatization, reacting to political scandals, or advancing social policy objectives. I restrict focus to policy events over 1967–2006, capturing a period of relative institutional stability; the start date roughly coincides with publicly listing Fannie and chartering Freddie, while the end date precedes the GSEs being taken into conservatorship. I exclude any policy events with implementation lags exceeding 12 months; news shocks with a wide range of implementation lags would weaken the first stage. Implementation lags range between zero and nine months, with an average lag of two months.

After monthly aggregation, there are 14 months with GSE regulatory interventions that are classified as not cyclically motivated over the 1967–2006 sample. Appendix B provides a brief description of each regulatory change that I use for identifying variation, and Appendix Table B.1 lists the policy description, projected effect on GSE holdings, news date, effective date, and classification of each policy. Appendix Figure B.3 depicts the not cyclically motivated GSE policy events used for identification (black), scaled to annualized GSE holdings over the previous year (left panel) and annualized mortgage originations over the previous year (right). For a sense of scale, GSE retained portfolio mortgage

[26] Regulatory rulings affecting the GSEs are typically published in the Federal Register.

purchases—excluding purchases pooled as MBS for third parties—averaged 9.7% of residential mortgage originations over 1967–2006. Figure B.3 additionally depicts the detrended growth in GSE mortgage holdings (blue). The expansionary (contractionary) narrative events overwhelmingly line up with periods of relative balance sheet growth (reductions). Instrument relevance is formally discussed below.

2.3.2 Benchmark LP-IV Regression Specification

The Jordà (2005) local projection method directly estimates impulse responses for each dependent variable of interest, y_t, with separate regressions for each forecast horizon $h \in \{0, 1, ..., H\}$. The direct forecasting method is particularly conducive to dealing with implementation lags following news about pending regulatory changes to GSE balance sheet constraints. I iteratively estimate the response of lending or construction activity to GSE purchases, rotating in various volumes of mortgage loans, bank loans, agency securities, and construction expenditures on the left-hand side. I separately estimate the cumulative change of each left-hand-side variable, $y_{t+h} - y_{t-1}$, over each horizon h in response to regulatory shocks announced at date t. The LP-IV variant is similar to Jordà's local projection method, but is estimated by 2SLS, with the first stage instrumenting for the structural shock of interest; see Ramey (2016a) and Stock and Watson (2018). Identification broadly rests on the assumption that the regulatory policy events classified as not cyclically motivated are correlated with actual GSE purchases but are uncorrelated with other structural shocks not spanned by a set of lagged macroeconomic controls. Assumptions for LP-IV instrument validity are discussed below.

The first-stage regressions instrument actual GSE mortgage purchases with the regulatory policy shocks. Quantifying a projected effect of each policy change for GSE mortgage holdings strengthens narrative instruments, say relative to treating policy events as indicator variables, but the quantification inherently involves a degree of measurement error. Measurement error, however, is not overly problematic so long as the policy events are used as instruments and are correlated with the unobserved structural shock of interest.[27] The first-stage regressions estimate the effect of the regulatory policy events on real GSE purchases of mortgages for their retained portfolio investments, p_t, cumulated over each h-month horizon following policies' announcements at time t:

$$\frac{\sum_{j=0}^{h} \mathrm{p}_{t+j}}{X_t} = \tilde{\alpha}_h + \tilde{\beta}_h \frac{m_t}{X_t} + \tilde{\phi}_h(L)\mathbf{Z}_{t-1} + \tilde{u}_{t+h} \quad \text{for } h = 0, 1, 2, \dots , \tag{2.1}$$

where m_t are the not cyclically motivated GSE policy events, quantified as the annualized projected effect on GSE mortgage holdings in real dollars. The response of cumulated GSE net purchases are iteratively estimated for each horizon h. Each regression additionally includes a vector of lagged mortgage market, interest rate, and macroeconomic controls, $\mathbf{Z}_{t-1}$, which is detailed below. Both cumulated GSE purchases and the GSE policy instruments are scaled relative to X_t, a trend of real personal income, akin to scaling time series by potential GDP but using a monthly series more related to housing.[28] The first stage amounts to estimating the effect of the regulatory policy events on near-term GSE purchases not forecast by the lagged controls, notably lagged purchases and mortgage market indicators.

[27] Greater measurement error will weaken the first stage but will not invalidate the instrument, so long as measurement error of the narrative shock and measurement error of actual GSE purchases are uncorrelated (Ramey and Zubairy, 2017).

[28] Trend real personal income is estimated by fitting a third-degree polynomial to monthly log real personal income. The scale factor is used to induce stationarity. Results are broadly robust to an alternative regression specification instead expressed in log first-differences; the benchmark specification, however, is more easily interpreted.

The second stage tests whether GSE purchase shocks crowd out commercial lending and non-residential construction activity. The cumulative response of each lending or construction volume, $y_{t+h} - y_{t-1}$, in response to GSE retained mortgage purchases is separately estimated for each h-month horizon:

$$\frac{y_{t+h} - y_{t-1}}{X_t} = \alpha_h + \beta_h \frac{\sum_{j=0}^{h} \mathrm{p}_{t+j}}{X_t} + \phi_h(L)\mathbf{Z}_{t-1} + u_{t+h} \quad \text{for } h = 0, 1, 2, \ldots, \tag{2.2}$$

All dependent variables rotated in to regression (2.2) are deflated using the core PCE price index. The coefficient of interest, β_h, measures the cumulative dollar response of each lending or construction volume, y_t, associated with an additional dollar in GSE mortgage purchases, both cumulated over the same h-month horizon. The sequence of β_h for horizon $h \in \{0, 1, ..., H\}$ traces out dynamic impulse responses, interpreted as the credit or construction spending multiplier per dollar in GSE purchases. Rather than estimating (2.2) using actual GSE purchases, β_h is estimated by 2SLS, instrumenting mortgage purchases with the GSE regulatory policy events in the first stage (2.1). In iteratively estimating (2.2) for varying impulse response horizons h, the regression residuals $\widehat{u_{t+h}}$ will be serially correlated for $h > 0$. Accordingly, all confidence intervals are constructed with heteroskedasticity and autocorrelation consistent standard errors. Unless otherwise noted, all regressions are estimated over a monthly sample from January 1967–December 2006.

The second stage amounts to estimating the effect of regulatory shocks to GSE mortgage purchases on near-term lending or construction spending that has been orthogonalized to a rich set of lagged controls. Each regression includes 12 lags of a vector of control variables $\mathbf{Z}_{t-1}$, where $\phi_h(L)$ is a polynomial of the lag operator. The controls include variables with predictive content for the dependent variables to reduce the sampling variance of the LP-IV estimator, including lagged values of the dependent variable scaled to trend real personal

income. Lagged values of GSE net purchases and purchase commitments, both scaled to X_t, are always included for their predictive content for near-term GSE purchases in the first-stage regressions. In addition, $\mathbf{Z}_{t-1}$ contains variables with predictive content for mortgage and commercial lending, housing activity, risk-free rates, and credit risk premia: the log level of real mortgage originations and log level of housing starts; residential mortgage debt growth, real house price index growth, and core PCE price index growth; the 3-month T-bill rate and 10-year Treasury rate; and the conventional mortgage rate spread and BAA–AAA corporate bond spread.[29] I include lagged values of the unemployment rate and real personal income growth as cyclical controls in the benchmark regression specification. The rich set of lagged controls additionally serves to reduce the stringency of the identifying assumptions.

For the GSE regulatory policy shocks, m_t, to be a valid instrument in this LP-IV framework, they must satisfy conditions for relevance (A1), contemporaneous exogeneity (A2), and lead/lag exogeneity (A3):

$$\text{A1.} \quad \mathbb{E}\left[u_{1,t}^{\perp} m_t^{\perp'}\right] \neq 0$$

$$\text{A2.} \quad \mathbb{E}\left[u_{2:n,t}^{\perp} m_t^{\perp'}\right] = 0$$

$$\text{A3.} \quad \mathbb{E}\left[u_{t+j}^{\perp} m_t^{\perp'}\right] = 0 \text{ for } j \neq 0,$$

where $u_{t+h}^{\perp} = u_{t+h} - \text{Proj}(u_{t+h} \mid \phi_h(L)\mathbf{Z}_{t-1})$ are the regression residuals in (2.2) orthogonalized to the lagged controls, and $u_{1,t}^{\perp}$ correspond to GSE purchases and $u_{2:n,t}^{\perp}$ to all other endogenous variables. Analogously to their microeconometric IV counterparts, (A1) and (A2) amount to assuming that the not cyclically motivated GSE regulatory changes directly affect agency purchases, but are contemporaneously uncorrelated with other endogenous variables of interest. The

[29] Identical controls are used in the first-stage regressions (2.1). All growth rates are measured on a quarter-over-quarter basis. See Appendix B for data sources and details.

lead/lag exogeneity condition (A3) arises from the local projection dynamics, as the left-hand side depends on the entire history of shocks up to $t + h$. The lagged controls, however, reduce the stringency of the contemporaneous exclusion restriction (A2) and lagged exclusion restriction (A3): GSE regulatory shocks must be uncorrelated with other contemporaneous or lagged structural shocks not spanned by the set of lagged macroeconomic controls. In estimating (2.1), I exclude policy events classified as cyclically motivated in order to avoid correlation of the narrative instrument with other contemporaneous or lagged shocks. The narrative instruments are additionally dated to each policy's news first being made public to preclude correlation with past news shocks. Lead exogeneity is less stringent, and will be satisfied so long as the narrative instrument is constructed from variables realized at date t or earlier. The projected effects of the regulatory changes are deliberately quantified using only ex ante information available up to the date t policy announcements to satisfy the lead exogeneity condition.

2.3.3 Diagnostics for Instrument Validity: Relevance and Lag Exogeneity

Instrument relevance is testable using standard diagnostics. Figure 2.2 depicts the robust F-statistics for the first-stage regressions of cumulated GSE mortgage purchases on the not cyclically motivated GSE regulatory policies, estimated over each horizon h as in equation (2.1). The left panel depicts the first-stage robust F-statistics for 2SLS estimates of the response of GSE mortgage holdings to GSE regulatory shocks, rotating in 12 lags of scaled GSE mortgage holdings

as additional controls. The right panel depicts the first-stage robust F-statistics for 2SLS estimates of the response of residential mortgage debt excluding GSE mortgage holdings, with 12 lags similarly rotated in as controls. Instrument strength varies somewhat by horizon as lagged controls are rotated in for each left-hand-side variable of interest, but robust F-statistics are generally near or well above a threshold of 10 for horizons of 6 and 48 months after news about pending regulatory changes; results are accordingly reported for this impulse response horizon, when the narrative instruments have significant predictive power for actual GSE purchases. Treatment of the narrative instrument as news shocks about pending changes, subsequent policy implementation lags, and purchases lagging the exercise of advanced purchase commitments all contribute to the lower F-statistics at shorter horizons.

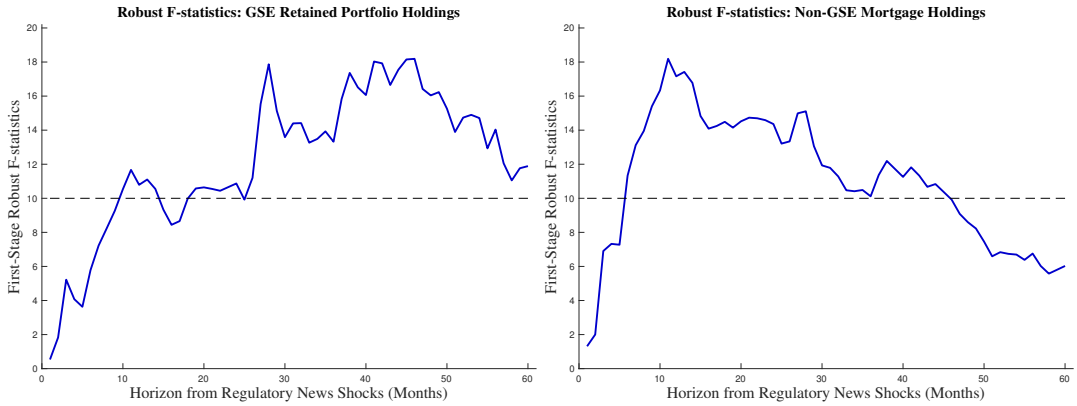

Figure 2.2. Instrument Relevance: Robust F-statistics

Notes: Newey and West (1987) robust F-statistics are calculated as in equation (2.1). Sources: see the data appendix.

Appendix Figure B.4 depicts the corresponding second-stage response of GSE mortgage holdings to a one-dollar increase in GSE mortgage purchases, estimated over each horizon h using the GSE policy events as in equation (2.2). Regulatory policies documented in the narrative analysis were expected to re-

sult in significant changes in GSE mortgage holdings, and a significant response of GSE mortgage holdings provides further evidence of instrument relevance: GSE mortgage holdings see a significant rise shortly following news shocks about pending regulatory changes, increasing roughly 80 cents per dollar of cumulated purchases after six months. The expansion gradually declines thereafter, but remains statistically significant at conventional levels—evidence that the regulatory shocks induce persistent GSE balance sheet responses.

With the narrative identification strategy, the econometrician might reasonably be concerned about misclassifying policies endogenously driven by recent economic conditions as not cyclically motivated; such policy endogeneity would introduce spurious correlation between the instrument for structural shocks to GSE purchases and other structural shocks.[30] Reassuringly, the GSE regulatory policies that I classify as not cyclically motivated are not predicted by lagged values of cyclical economic indicators, notably the unemployment rate, mortgage spreads, or growth in housing starts or real personal income. Given the inclusion of the lagged macroeconomic and cyclical controls, this is a more stringent test of lag exoegenity than actually required for instrument validity. Appendix B documents that the headline results are broadly robust to dropping individual policy events from the instrument, further easing concerns about errant misclassification.

The precise lag exogeneity condition is formally testable: after conditioning on the lagged controls, other past shocks should not be correlated with the narrative instrument. To test the lag exogeneity requirement, I estimate equation (2.2) as a single-stage LP-OLS regression to obtain fitted values of the error

[30]Conversely, non-systematic misclassification of truly not cyclically motivated policies as cyclically motivated will merely reduce instrument strength.

terms, $\widehat{u_t^{\perp}}$, that have been orthogonalized to the set of lagged controls. Appendix Figure B.5 depicts the correlation of the narrative instrument (scaled to trend real personal income) with lagged error terms $\widehat{u_{t-j}^{\perp}}$ for $j \in \{1,\ 2, ...,\ 12\}$, along with 95% confidence intervals. Correlations with lagged error terms are calculated for regressions measuring the response of GSE mortgage holdings (left panel) and total residential mortgage debt (right panel) to actual GSE purchases. In both cases, I fail to reject the null hypothesis that the narrative instrument is uncorrelated with lagged structural shocks after conditioning on the lagged controls. Similarly, the narrative instrument is not predicted by lags of GSE purchases orthogonalized to the control variables.

2.4 Lending Responses to Subsidized Mortgage Purchases

Partial equilibrium models of credit policies predict that subsidies will expand targeted lending and may crowd out non-targeted borrowing; the degree of crowd out, however, hinges significantly on how the supply of credit is modeled.[31] If total bank credit or the flow of originations are constrained by information frictions, regulatory constraints, or underwriting capacity constraints, subsidizing an expansion of mortgage lending will crowd out other lending to some degree. In this section I test whether regulatory shocks to subsidized GSE purchases crowd out commercial lending. My empirical strategy avoids having to take a stance on the elasticity of credit supply or the nature and degree of credit frictions. To shed light on the transmission mechanisms of housing

[31] Gale (1991) estimates that the introduction of federal credit policies reduces non-targeted general borrowing between 1% and 4.6%, depending on an elasticity of credit supply ranging from 0.5 to 5; see Gale (1991). Conversely, there is no credit crowd out in the model of Lucas (2016) because the supply of credit is assumed to be perfectly elastic.

credit policies, I additionally test for evidence of GSE purchase shocks operating through a mortgage origination channel and a safe asset supply channel.

2.4.1 Crowd-in, Crowd-out: Private Sector Mortgage Lending Responses

I first estimate the responses of domestic private sector lending to GSE purchase shocks, testing whether subsidizing an expansion in residential mortgage borrowing involves a tradeoff with respect to commercial real estate lending. For a cleaner link with the flow of primary market originations, I first analyze the level response of private holdings of mortgage loans to GSE purchase shocks. I analyze flow mortgage origination responses in Section 2.4.2 and level responses of securitized mortgage debt in Section 2.4.3.

Figure 2.3 depicts the response of private sector holdings of whole mortgages to a one-dollar increase in GSE retained portfolio mortgage purchases, estimated by 2SLS as in equation (2.2) using the not cyclically motivated policy events. Finer dashed lines are 68% and 95% Newey and West (1987) confidence intervals. In the top-left panel, private holdings of home mortgages see an early, statistically significant spike at around six to eight months that dissipates after one year. The impulse response suggests that shocks to GSE demand spur an initial burst of home mortgage originations and temporary warehousing of loans that are subsequently passed on to the secondary market, as similarly documented using flow originations data in Section 2.4.2. The initial transitory increase in holdings of home mortgages is followed by a steady and statistically significant rise at horizons above two years. Over longer horizons, private hold-

ings of home mortgages increase by 25 to 50 cents in response to a one-dollar increase in GSE purchases—evidence of housing credit policies crowding in private home mortgage lending, as opposed to GSE ownership simply displacing private lending. The expansion in private home mortgage lending beyond two years is consistent with expansionary credit policies spurring new housing construction and, at a lag, mortgage financing for new home sales; correspondingly, Section 2.5.1 documents a gradual, persistent rise in construction spending for single-family homes in response to GSE purchase shocks. The delayed expansion in private holdings of home mortgages only occurs after a transitory reduction in mortgage spreads fades, thus increasing the attractiveness of mortgage investments.[32]

If primary market lenders are constrained, being induced to originate or hold more home mortgages could reduce other loan originations or holdings. To the extent there is greater substitutability of loan officers across classes of mortgages than between mortgage and non-mortgage originations, crowd-out effects might be particularly acute for other types of mortgages. As depicted in the top-right panel of Figure 2.3, private holdings of multifamily mortgages—loans for buildings with five or more units, i.e. apartments or condominiums—see a small but persistent decline of roughly five to eight cents in response to a one-dollar increase in GSE mortgages purchases, which is broadly significant at 68% and 90% confidence levels. The bottom-left panel shows a larger decline in private holdings of (non-residential) commercial mortgages, which fall roughly 15 to 25 cents in response to a one-dollar shock to GSE purchases. The decline is persistent and significant at conventional levels for horizons beyond 10 months. The bottom-right panel of Figure 2.3 depicts the response of private holdings of

[32]Section 2.6 documents that GSE purchase shocks reduce mortgage spreads over a horizon of 8 to 18 months.

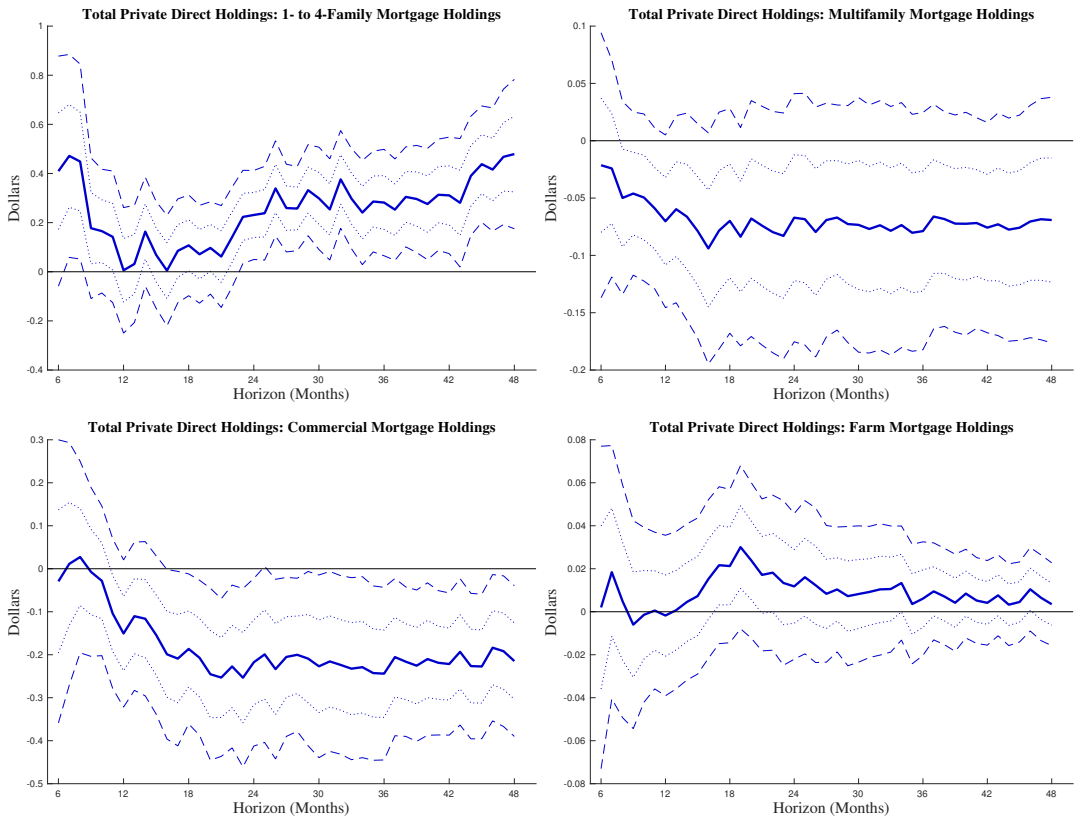

Figure 2.3. Responses of Private Sector Mortgage Holdings to GSE Purchase Shocks

Notes: Private sector direct holdings include those of commercial banks, savings banks, savings and loan associations, life insurance companies, mortgage companies, real estate investment trusts, state and local credit agencies, state and local retirement funds, noninsured pension funds, credit unions, and finance companies. Direct mortgage debt holdings exclude holdings of agency mortgage pools. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: see the data appendix.

farm mortgages, which is generally insignificant. The negative responses of private multifamily and commercial mortgage lending ensuing from GSE purchase shocks is evidence of U.S. housing credit policies crowding out commercial real estate lending, mirroring the GSEs' footprint in mortgage markets; Fannie and Freddie overwhelmingly transact in conventional mortgages for single-family homes, although their charters were broadened in 1992 to promote multifamily mortgage lending.[33]

[33] A 1992 reform bill revised the agencies' statutory charters from providing stability in the

Decomposing the aggregate response of private mortgage lending across types of loans provides evidence of federal credit policies crowding in home mortgage lending while simultaneously crowding out non-targeted lending. If GSE purchase shocks induce such a reallocation of credit through a mortgage origination channel, the effect should vary across financial sectors depending on degrees of originations activity. Appendix B separately tests the response of mortgage holdings for commercial banks and thrift banks, life insurance companies, and other private entities (including mortgage companies and credit unions). The mortgage lending responses of depository institutions and other private entities to GSE purchase shocks are significant and qualitatively similar to the disparate responses depicted in Figure 2.3. Conversely, the responses of life insurers' home mortgage holdings are muted and only marginally significant. Life insurance companies hold a broadly diversified asset portfolio, including residential and commercial mortgages, but only play a marginal role in originating mortgages. Portfolio rebalancing effects ensuing from GSE purchase shocks are concentrated in sectors with a larger footprint in mortgage originations—further evidence of the transmission of GSE purchases operating in part through a mortgage origination channel.

"secondary market for home mortgages" to "secondary market for residential mortgages." Freddie Mac had recently exited the multifamily mortgage market entirely in 1989 after suffering losses on its multifamily portfolio. The GSEs are barred from purchasing commercial and farm mortgages.

2.4.2 The Mortgage Origination Channel: Evidence from Mortgage Transaction Data

By subsidizing a surge in home mortgage originations, particularly for refinancing activity, GSE purchases could crowd out commercial loan originations. Sharpe and Sherlund (2016) document that surges in refinancing activity induce binding origination capacity constraints and credit rationing, with primary market lenders substituting away from more resource-intensive originations. To more directly test whether the transmission of secondary market purchases operates through a mortgage origination channel in the primary market, I estimate the response of mortgage origination and transaction flows to GSE purchases across primary mortgage market sectors. The underlying monthly mortgage transaction flow data are from the Department of Housing and Urban Development's discontinued Survey of Mortgage Lending Activity (SMLA), largely acquired from the National Archives and Records Administration. Unlike the Fed's Home Mortgage Disclosure Act (HMDA) data, the SMLA data cover loan repayment flows and originations of nonresidential mortgages and construction loans. If GSE purchases operate through a mortgage origination channel, stimulating residential originations should crowd out nonresidential originations, which the HMDA data cannot speak to.

The SMLA data, however, are only available for January 1970–December 1997. Accommodating 12 monthly lags for control variables and h monthly leads for local projection impulse response horizons further reduce the effective sample for estimation.[34] Unfortunately the narrative record of GSE policy

[34]Local projection regressions require h observations after the sample end point for estimating $t + h$ horizon responses. For the benchmark analysis, additional observations are added beyond December 2006, which cannot be done with the SMLA data.

events is an underpowered instrument for samples truncated to accommodate the SMLA data.[35] As such, the response of mortgage flows to actual GSE purchases is instead estimated by single-stage LP-OLS regressions:

$$\frac{\sum_{j=0}^{h} f_{t+j}}{X_t} = a_h + b_h \frac{\sum_{j=0}^{h} p_{t+j}}{X_t} + \phi_h(L)\mathbf{Z}_{t-1} + \varepsilon_{t+h} \quad \text{for } h = 0, 1, 2, \ldots, \tag{2.3}$$

where monthly mortgage origination flows, f_t, and GSE purchases, p_t, are both cumulated over each horizon h. The forecast horizon is reduced from 48 to 24 months to extend the sample end point, while the unemployment rate and personal income controls are dropped to conserve on parameter estimation in the truncated sample. Lags of the left-hand-side mortgage flows, deflated and scaled by trend real personal income, are rotated in for each regression, and all other lagged controls are as described in Section 2.3.2. The LP-OLS estimator, b_h, measures the residual origination flows not forecast by lagged housing, loan origination, and interest rate controls, estimated per dollar in cumulated GSE purchases; LP-OLS regressions with robust controls are the local-projection direct forecasting analog of factor-augmented vector autoregressions.

The top row of Figure 2.4 depicts the cumulated dollar flow of residential mortgage originations, estimated across all primary market sectors (left column), for mortgage companies (middle), and for commercial banks (right). The top-left panel depicts a significant increase in total residential mortgage originations, which rise by roughly \$2.25 per dollar of increased GSE purchases. Mortgage companies and commercial banks account for almost all of the increase in residential originations.[36] The top-middle panel shows a steady rise in mortgage companies' residential originations, increasing as much as \$1.70 per

[35] There are only 10 months with not cyclically motivated narrative policy events for the January 1971–December 1995 sample.

[36] Savings and loan associations see a more muted, short-lived rise in residential mortgage originations and sales (not depicted).

dollar in GSE purchases. The top-right panel depicts commercial banks' residential originations increasing by as much as 50 cents on the dollar. Residential mortgage repayments also steadily rise, increasing roughly $1.75 per dollar in cumulated GSE purchases, with repayments largely flowing to agency MBS (not depicted). The coincident rise in residential originations and repayments is evidence of increased refinancing activity in response to GSE purchases; the level of residential mortgage lending would see a smaller increase than the flow volume of mortgage originations because of increased repayments of outstanding mortgages. By subsidizing an expansion in refinancing activity, GSE purchases could tighten mortgage origination capacity constraints.

The second row of Figure 2.4 depicts the response of primary market lenders' net residential mortgage acquisitions being retained by the primary market (the sum of new originations and purchases net of sales). Primary market lenders see a significant rise in net residential acquisitions over four months that dissipates within one year, indicative of temporarily warehousing new originations then sold off to the secondary market; the short-lived increase in private holdings of home mortgages depicted in Figure 2.3 is indicative of the same warehousing dynamic. Mortgage companies sell off mortgages to the secondary market at nearly the same rate as their flow of originations, consistent with an industry reliant on secondary market funding. Mortgage companies' short-term loan inventory is financed by warehouse lending, typically large-scale revolving credit lines with commercial banks; the expansion in originations of mortgage companies may thus tighten commercial bank funding constraints. Unlike mortgage companies, depository institutions have the option of retaining newly originated mortgages. Commercial banks' residential mortgage originations are increasingly retained on balance sheet at horizons above eight months. Advanced

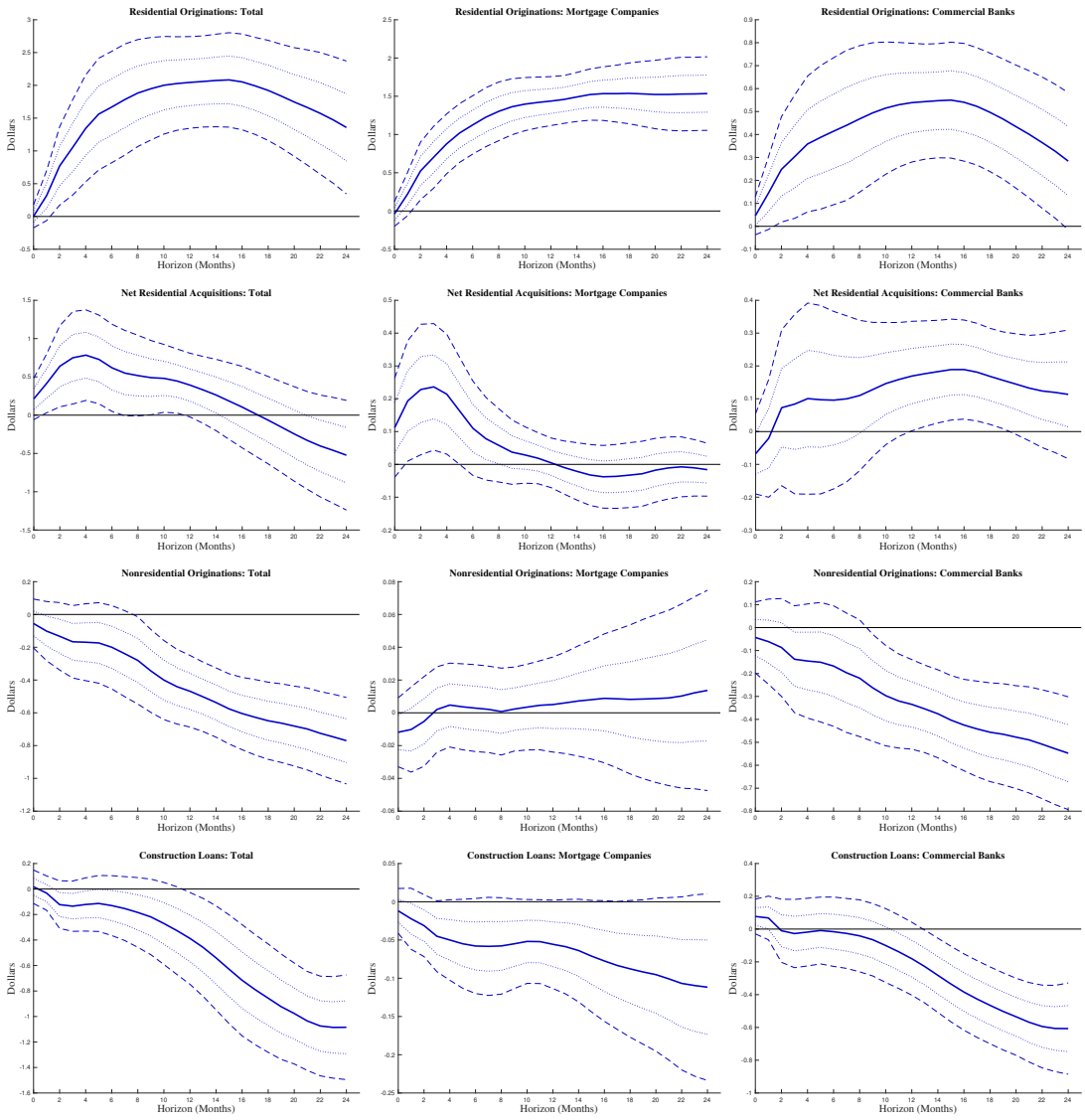

Figure 2.4. Mortgage Origination Responses to GSE Purchases

Notes: Finer lines 68% and 95% Newey and West (1987) confidence intervals. Sources: U.S. Department of Housing and Urban Development Survey of Mortgage Lending Activity; see the data appendix.

GSE mortgage purchase commitments typically expire after 12 months, giving banks a window to learn about borrower characteristics and retain more desirable loans. GSE purchases appear to induce commercial banks to originate more mortgages than they sell to the secondary market—consistent with GSE purchases crowding in private residential mortgage holdings over longer hori-

zons, as depicted in Figure 2.3.

If origination capacity constraints bind, GSE purchases inducing a significant expansion of residential originations may reduce originations of other loans. The third and fourth rows of Figure 2.4 depict the response of nonfarm nonresidential mortgage originations and construction loan originations, respectively, to GSE purchases. In response to one dollar of GSE purchases, total nonresidential mortgage originations decline by 45 to 55 cents at horizons of one to two years. Commercial bank nonresidential originations see a gradual, statistically significant decline, falling roughly 40 cents per dollar in GSE purchases cumulated over two years. The bottom-left panel shows a sharp decline in construction loans starting after one year, with lending activity falling more than one dollar per dollar in GSE purchases. Much of the decline in total nonresidential mortgage lending and construction lending is attributable to commercial banks' loan activity. Commercial banks' construction loan originations fall by more than 60 cents per dollar in GSE purchases as commercial bank net residential acquisitions rise. The transaction flows for mortgage companies reassuringly reflect an industry reliant on selling residential originations to the secondary market and minimizing inventory.

The regression analysis of SMLA mortgage transaction data suggests that GSE demand for mortgages induces a tradeoff between expanding residential mortgage originations and decreasing originations of nonresidential mortgages and construction loans. While the LP-OLS estimates of mortgage transaction flows have less of a causal interpretation than the LP-IV estimates, they nonetheless support the transmission of housing credit policies operating through a mortgage origination channel in the primary market.

2.4.3 The Safe Asset Supply Channel: Evidence from GSE Securities Issues

The transmission of housing credit policies may additionally operate through a safe asset supply channel, both in subsidizing an expansion in mortgage lending and tightening bank balance sheet constraints. An expansion of GSE mortgage purchases will be funded with new issues of agency securities, which are classified as safe assets by Gorton, Lewellen, and Metrick (2012). Safe assets are understood to be information-insensitive, and to play a money-like role in facilitating commerce because of their efficient use as collateral. The safety premium on agency securities, derived from an implicit government guarantee, is in part passed on a subsidy to mortgage borrowers in the form of lower mortgage rates; see Passmore, Sherlund, and Burgess (2005) and Passmore (2005). Regulatory shocks to the supply of agency securities may additionally tightening bank balance sheet constraints by competing for wholesale funding, similar to the effect of government debt issues in the models of Gale (1991) and Gertler and Kiyotaki (2010). The share of assets considered "safe" has been stable in the post-war era, suggesting that (1) the demand for information-insensitive collateral has been relatively constant relative to total assets and (2) government and agency debt is a close substitute for privately supplies safe assets, notably bank debt (Gorton, Lewellen, and Metrick, 2012).[37] I estimate the responses of agency debt and agency MBS outstanding to regulatory shocks affecting GSE purchases to test for evidence of their transmission operating in part through a safe asset supply channel.

[37]Krishnamurthy and Vissing-Jørgensen (2012) provide evidence on the safety and liquidity premia of U.S. Treasuries, and find that highly rated commercial paper is a substitute for Treasuries.

The top panel of Figure 2.5 shows the response of agency notes and bonds outstanding to a one-dollar regulatory shock to GSE retained mortgage purchases, estimated by 2SLS as in regression (2.2). The top-left panel depicts a significant rise in Fannie's debt outstanding shortly after news about pending regulatory changes, increasing roughly one-for-one with purchases over the first six months.[38] The top-right panel depicts a significant, persistent response of all housing GSE debt outstanding.[39] The responses of agency debt closely resemble the response of GSE mortgage holdings to a one-dollar shock to purchases, as seen in Appendix Figure B.4, consistent with GSE mortgage holdings being highly leveraged. As expected, the narrative regulatory shocks induce an increased supply of safe agency bonds—with the potential to subsidize mortgage borrowing and, in the presence of credit frictions, crowd out bank funding.

Agency MBS are another import conduit for housing credit policies subsidizing an expansion in mortgage borrowing, and regulatory shocks to GSE mortgage holdings likely affect the supply of agency MBS.[40] The agency MBS issued and guaranteed by Fannie and Freddie are highly liquid securities with (perceived) implicit backing from the U.S. Treasury; these safety and liquidity features serve to subsidize mortgage borrowing, as does an underpricing of MBS guarantee fees. The mortgage purchase series used to estimate equations (2.1) and (2.2) reflect purchases intended for the GSEs' retained investment portfo-

[38]The response of Fannie Mae's debt outstanding accounts for most of the increase in total GSE debt, indicative that most of the identifying variation from the narrative analysis stems from policy changes affecting Fannie's mortgage holdings.

[39]The FHLBanks collectively issue bonds, known as consolidated obligations, to finance their collateralized advances to members; the expansion of mortgage lending and housing market stimulus ensuing from GSE purchases could have direct spillovers to the volume of advances and related consolidated obligation issues. Consolidated obligations are also considered safe assets.

[40]After mortgage securitization was popularized by Ginnie and Freddie in the early 1970s the share of U.S. residential mortgage debt securitized as agency MBS steadily rose to roughly 45% of that outstanding by the early 2000s, as depicted in Figure B.1.

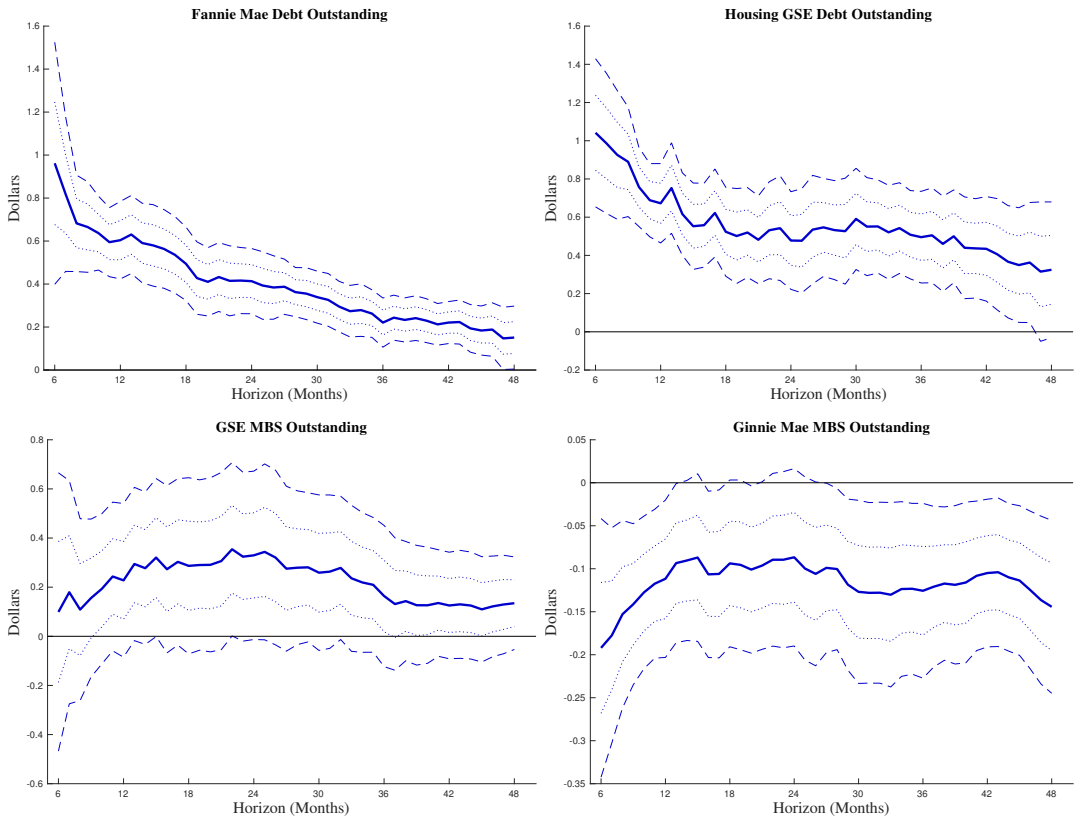

Figure 2.5. Response of Agency Debt and Agency MBS to GSE Purchase Shocks

Notes: Housing GSE debt is the sum of Fannie Mae, Freddie Mac, and Federal Home Loan Bank System medium- and long-term notes and bonds outstanding. Data have been seasonally adjusted using the Census Bureau's X-13 program. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: See the data appendix for details.

lios, excluding purchases for pooling and issuing MBS; however, mortgages recently purchased as investments can, to a degree, be subsequently securitized. As with new issues of agency bonds, an increase in the supply of GSE MBS could crowd out privately supplied safe assets and tighten banks' balance sheet constraints.

The bottom-left panel of Figure 2.5 depicts the response of MBS guaranteed by Fannie and Freddie to the GSE regulatory shocks. GSE MBS outstanding see a gradual increase of between 15 and 30 cents per dollar of purchases that

is broadly significant at conventional levels for the 12- to 36-month horizon; as with GSE bond issues, the expansion of GSE MBS increases the supply of safe assets and subsidizes mortgage borrowing.[41] Contrary to the gradual increase in GSE MBS, the volume of Ginnie Mae's guaranteed mortgage pools outstanding sees a significant reduction, as shown in the bottom-right panel. Within six months of the regulatory shocks Ginnie MBS fall by 20 cents per dollar in GSE purchases, and see a persistent reduction of 10 to 15 cents at horizons above 12 months. The lagged response of GSE MBS outstanding to the regulatory shocks is consistent with the GSEs first issuing purchase commitments and subsequently purchasing and pooling mortgages themselves, whereas the faster response of Ginnie MBS is consistent with a drop in originations of government-backed mortgages being pooled as originated.[42] More broadly, the responses of agency MBS volumes to GSE regulatory shocks suggests a substitution of originations toward GSE-eligible conforming mortgages and away from the government-backed mortgages in Ginnie's pools.

If the supply of domestic savings is relatively inelastic or if information and contracting frictions constrain interbank funding, issuing agency securities and competing for funding in capital markets will tighten balance sheet constraints, crowding out bank lending. Conversely, a safe asset supply channel would be dampened if foreign institutional investors absorb a significant share of the newly issued agency securities. Agency securities and U.S. bank loans are likely imperfect substitutes for foreign investors. Appendix B tests the response of foreign purchases of agency securities to the GSE regulatory shocks, using Treasury

[41] The data do not differentiate between agency MBS held by the GSEs versus third party holdings.

[42] Ginnie's pools are backed by mortgages partially guaranteed by other government agencies, with Ginnie guaranteeing timely payment to the holder of the security. Unlike the GSEs, all of Ginnie's MBS are pooled by approved private lenders.

International Capital System flow data. Most of the increased supply of agency securities and related U.S. residential mortgage lending is financed by domestic private resources, with foreign capital accounting for at most 20% of the near-term agency bond issues or longer-run expansion in U.S. residential mortgage debt.

2.4.4 Portfolio Rebalancing Effects: Balance Sheet Responses of Commercial Banks

If the transmission of GSE purchases operates through a mortgage origination channel, commercial banks' balance sheets should be significantly affected, in addition to their origination activity. Section 2.4.2 presents evidence that commercial banks significantly expand residential mortgage originations in response to GSE purchases, and retain a significant volume of their new residential originations while concurrently reducing originations of nonresidential loans. Beyond having a large footprint in mortgage originations, commercial banks' relatively diversified asset holdings and utilization of interbank loan markets could additionally result in credit rationing through a safe asset supply channel of housing credit policy.

Figure 2.6 depicts aggregate balance sheet responses of domestic commercial bank lending activity to a one-dollar increase in GSE purchases, estimated by 2SLS as in regression (2.2). In the top-left panel, commercial banks' total loans and leases see a fairly persistent decline of around 30 to 50 cents per dollar of GSE purchases, which is significant at 68% or 90% confidence levels after one year. The top-right panel depicts the response of commercial banks' hold-

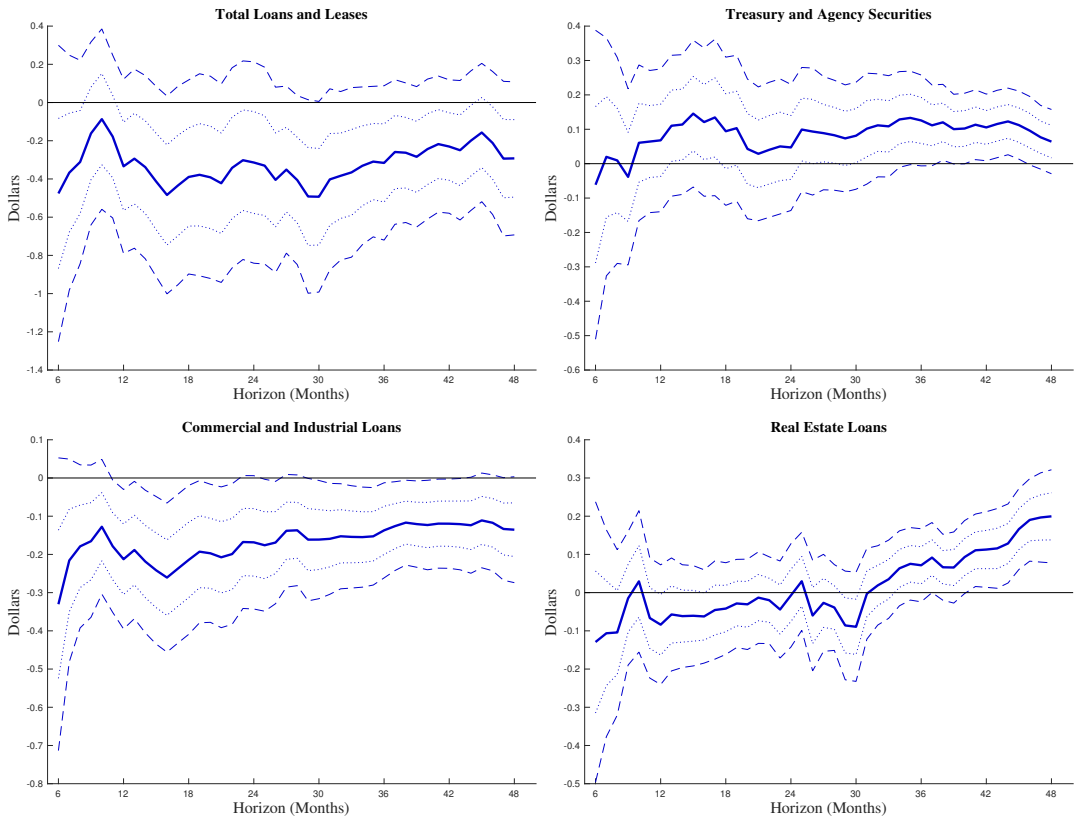

Figure 2.6. Commercial Bank Balance Sheet Responses to GSE Purchase Shocks

Notes: Real estate loans include home mortgages, revolving home equity loans, and commercial real estate loans. Consumer loans include credit cards, auto loans, student loans, personal loans, and other forms of revolving credit. Treasury and agency securities include all liabilities of the U.S. Treasury Department, other U.S. government agencies, and U.S. GSEs. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: Federal Reserve Board Table H.8; see the data appendix.

ings of Treasuries, agency bonds, and agency MBS, which see something of a mirror image of the response of loans and leases. Government agency securities holdings rise roughly 10 to 15 cents in response to one dollar in GSE purchases, an increase that is broadly significant at horizons above two years. The rise in holdings of government agency securities drives a persistent, significant increase in commercial banks' holdings of total securities (not depicted). Commercial banks appear to substitute away from loans and toward securities as the supply of agency securities concurrently expands in response to GSE regulatory

shocks, as depicted in Figure 2.5.

The bottom-left panel depicts a persistent decline in C&I lending activity in response to GSE purchases, which accounts for much of the reduction in commercial banks' total loans (depicted above). A one-dollar shock to GSE purchases induces a statistically significant 15- to 25-cent decrease in C&I loans at horizons beyond nine months. The initial reduction in C&I lending in response to GSE purchase shocks coincides with commercial banks' expansion of residential mortgage originations and contraction in nonresidential originations over shorter horizon, as depicted in Figure 2.4. If an increase in residential originations, particularly for refinancing, tightens underwriting capacity constraints, a substitution away from relatively costly originations may be concentrated in business loans; Chakraborty, Goldstein, and MacKinlay (2017, 2018) find corroborating evidence of a tradeoff between increased mortgage originations and decreased C&I loan growth. The bottom-right panel shows the response of commercial banks' combined real estate loans, including residential mortgages, home equity loans, and commercial real estate loans. Commercial banks' real estate loan volumes do not significantly respond for several years after GSE purchase shocks, but eventually rise roughly 20 cents on the dollar. The response of real estate loans over shorter horizons, however, masks a rise in the flow of both residential originations and sales to the secondary market, as depicted in Figure 2.4.

The aggregate balance sheet responses of commercial banks suggest that GSE purchase shocks induce a significant degree of portfolio rebalancing, consistent with credit rationing arising from credit frictions and a partially inelastic supply of credit. The balance sheet responses—particularly the substitution to-

ward agency securities—are consistent with intermediation constraints being tightened by an increase in the supply of safe agency securities, which would both subsidize an expansion of home mortgage originations and crowd out interbank funding. The evidence of C&I credit crowd out from the transmission of GSE purchases echoes similar results of Chakraborty, Goldstein, and MacKinlay (2017) for the Fed's MBS purchases; the authors find that banks with more exposure to the Fed's MBS purchases increase mortgage originations and decrease C&I lending relative to banks with less exposure, which they attribute to a mortgage origination channel.

2.5 Real Responses to Subsidized Mortgage Purchases

Section 2.4 presents evidence of credit rationing arising from the subsidized government intermediation of mortgage lending, as would be predicted by the model of Gale (1991) if credit supply was partially inelastic. The intended effect of GSE purchases expanding home mortgage borrowing and unintended effects of crowding out commercial lending may additionally translate to a reallocation of real economic activity. Congressional policymakers often cite stimulating construction activity or employment as an intended effect of expansionary housing credit policies. Moreover, understanding the real effects of mortgage subsidies is relevant to the ongoing sharp reduction in the share of U.S. mortgage debt being subsidized by Fannie, Freddie, and the Fed. The small literature on the economic effects of federal credit policies has not directly mapped subsidies and credit reallocations to real economic activity; see Gale (1991) and Lucas (2016). My identification strategy based on exogenous regulatory variation in GSE purchases can speak to real-financial linkages. I directly test whether the

divergent credit responses to GSE purchase shocks map to a similar reallocation of real economic activity, particularly for construction activity and employment.

2.5.1 Crowd-in, Crowd-out: Construction Sector Responses to GSE Purchases

I constructed an extended time series for construction expenditure flows from historical reports of the U.S. Census Bureau's Value of Construction Put in Place survey.[43] Figure 2.7 depicts the cumulated flow value of new real construction spending in response to a one-dollar increase in GSE purchases, estimated by 2SLS as in regression (2.2). The top-left panel shows a gradual but persistent rise in private construction spending for new single-family homes. The increase is statistically significant at conventional levels for horizons beyond three years, with single-family home construction spending rising 10 to 20 cents per dollar in GSE purchases. The gradual rise in construction expenditures for single-family homes in response to GSE purchase shocks complements a finding of Fieldhouse, Mertens, and Ravn (2018), who document a significant rise in housing starts roughly 6 to 18 months after news about regulatory changes to agency mortgage purchases. Moreover, increased single-family home construction is consistent with the medium-term expansion of home mortgage debt depicted in Figure 2.3, as new purchase mortgages are originated when newly completed homes are sold.

The top-right panel of Figure 2.7 depicts the response of private construc-

[43]The survey has been conducted since 1960, but historical time series are only available from the Census Bureau dating back to 1993. For this analysis, the more recent seasonally adjusted data have been spliced together with older time series manually constructed (and seasonally adjusted) from the historical survey reports; see the data appendix for details.

tion spending for new multifamily buildings. The point estimates depict a persistent decline at horizons above 18 months. Multifamily construction sees a decline of four to six cents for horizons above three years that is significant at the 68% confidence level. Nonresidential construction spending also sees a decline that is significant at the 68% confidence level (not depicted). The bottom-left panel shows a persistent, negative response of all private construction spending excluding single-family home building that is always significant at the 68% confidence level; at horizons approaching four years the gradual decline reaches roughly 20 cents per dollar in GSE purchases, which is significant at the 90% confidence level. The gradual rise in new single-family home construction spending mirrors the steady decrease in all other private construction spending, suggesting that housing credit subsidies reallocate real activity across sectors.

The bottom-right panel of Figure 2.7 shows no significant effect of GSE purchase shocks on total construction spending. Similarly, there is no statistically significant effect on public sector construction spending (not depicted), which is reassuring, as private credit reallocations should not affect construction financed with tax revenues or referendum-driven municipal bond issues. The construction responses to GSE purchase shocks are broadly consistent with U.S. housing credit policy reallocating both credit flows and related real activity across markets without boosting aggregate construction. Regarding fixed investment, Fieldhouse, Mertens, and Ravn (2018) only document a significant response of housing starts to government agency mortgage purchases, which might misleadingly suggest that housing credit policies could be an effective tool for demand stabilization. Moreover, the positive response of total housing starts masks a reallocation of investment toward single-family housing and

away from multifamily housing; see Appendix B for more details.

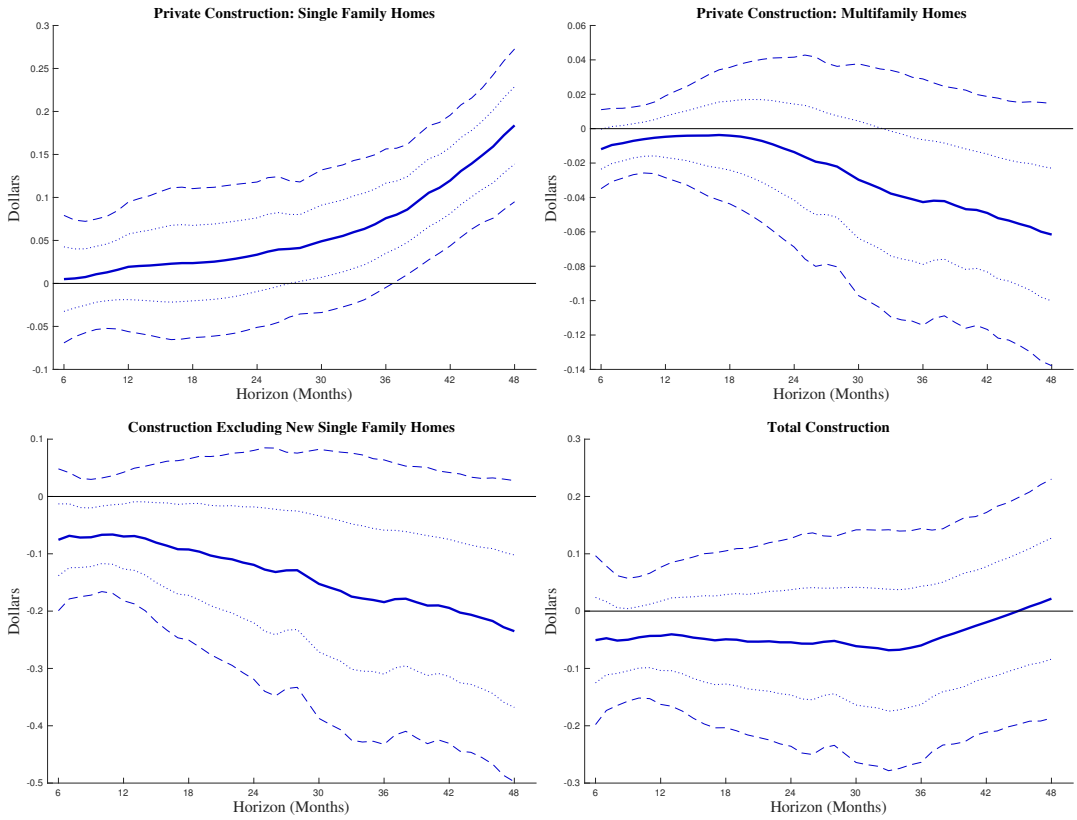

Figure 2.7. Flow Value of New Construction in Response to GSE Purchase Shocks

Notes: Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: U.S. Census Bureau Value of Construction Put in Place Survey; see the data appendix.

2.5.2 Labor Market Neutrality: Employment Responses

I modify regression (2.2) to accommodate measures of economic activity that are not dollar denominated. I estimate the response of nonfarm payroll employment, e_t in log point changes over each h-month horizon in response to date t news shocks about GSE regulatory changes. To better capture news about pending balance sheet changes, I use advanced purchase commitments, c_t, as the right-hand-side measure of GSE retained portfolio activity; advanced purchase

commitments are issued ahead of purchasing loans from the primary market, and thus respond faster to regulatory shocks than purchases. I use the regulatory policy news shocks as an instrumental variable for annualized purchase commitments made in the eight months following policy announcements.[44] The shock to annualized purchase commitments are scaled to trend mortgage originations, $\bar{X}_t$, for easier interpretation than scaling by trend real personal income. The sequence of β_h for horizon $h \in \{0, 1, ..., H\}$ traces out impulse responses capturing the percentage change in employment to a one-percentage-point shock to anticipated GSE purchases as a share of residential mortgage originations:

$$\log(e_{t+h}) - \log(e_{t-1}) = \alpha_h + \beta_h\Big(\frac{12}{8} \times \frac{\sum_{k=0}^{7} \mathrm{c}_{t+k}}{\bar{X}_t}\Big) + \phi_h(L)\mathbf{Z}_{t-1} + u_{t+h} \quad \text{for } h = 0, 1, 2, ... \tag{2.4}$$

Equation (2.4) is estimated by 2SLS, instrumenting annualized GSE purchase commitments with the narrative regulatory policy shocks, m_t, in the first stage. The set of lagged controls, $\mathbf{Z}_{t-1}$, is identical to those for the credit and construction multipliers estimated as in (2.2). Twelves lags of the left-hand-side variables are similarly rotated into the control set, expressed in log first differences.

Figure 2.8 depicts impulse responses for employment following news about pending GSE balance sheet expansions, estimated as in equation (2.4). Despite the expansion in construction for single-family homes, construction sector employment never sees a response that is significant at conventional levels (top-left), consistent with the offsetting decline in other private construction activity depicted in Figure 2.7. Similarly, there is no significant response of manufacturing sector employment (top-right) or total employment (bottom-left) following regulatory shocks to GSE purchases. Subsidizing an expansion in home

[44]The eight-month horizon maximizes the first-stage robust F-statistics, but point estimates are similar for varying horizons.

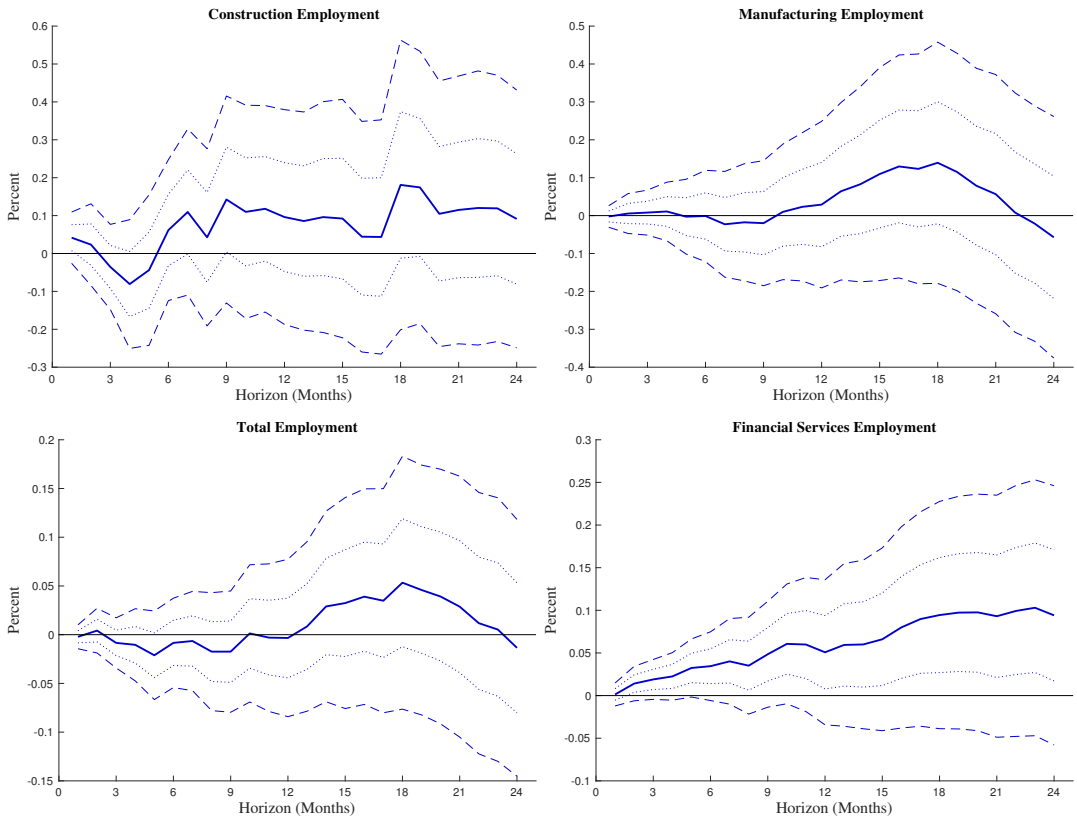

Figure 2.8. Employment Responses to GSE Purchase Shocks

Notes: Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: see the data appendix.

mortgage lending in an attempt to boost employment, as Congress has often intended, appears entirely ineffectual.

The bottom-right panel, however, depicts a significant rise in financial services employment, consistent with binding origination constraints arising from loan officers. Sharpe and Sherlund (2016) document significant mortgage processing constraints arising from refinancing booms, and find evidence of credit rationing away from more resource-intensive underwriting activity. The authors document that mortgage industry labor capacity is unresponsive to booms in refinancing applications, which are unpredictable and transitory, but does respond to changes in demand for purchase originations; consistent with a

more gradual increase in hiring loan officers, Appendix B documents a gradual, significant rise in new single-family homes sales, lagging behind increases in building permits and housing starts. The positive response of financial services employment is further evidence suggesting GSE purchases operate through a mortgage originations channel.

2.6 Robustness Checks and Extensions

The patterns of GSE purchases expanding home mortgage lending and single-family home construction while crowding out commercial real estate lending and construction activity is robust to many details of the analysis, discussed at length in Appendix B. Headline results are broadly robust to analyzing alternative dependent variables, controlling for interactions with other areas of federal policy, excluding individual regulatory events from the instrument, and adjustments to the set of lagged macroeconomic controls.

The effect of GSE purchases stimulating single-family housing investment and crowding out real activity in the commercial real estate market is robust to analyzing alternative dependent variables. Appendix Figure B.8 depicts significant responses of building permits, housing starts, and new home sales for single-family homes being stimulated in response to GSE purchase shocks; conversely, there is evidence of a short-term contraction in multifamily housing starts. The impulse responses are in line with the divergent construction multipliers depicted in Figure 2.7. Moreover, the staggered lags in the responses for single-family housing activity lends further credibility to the causal interpretation of impulse responses to the regulatory policy shocks: the response of

building permits leads that of housing starts, which in turn leads that of new home sales, as real estate development actually transpires.

An overarching question is the degree to which shocks to the supply of mortgage credit is driving reallocations across sectors, as opposed to unobserved shocks to loan demand or construction sector supply constraints. An expansionary shock to the supply of subsidized mortgage credit might predict an increase in mortgage lending, a decrease in mortgage spreads, a decrease in commercial lending, and an increase in commercial loan rate spreads. In line with two of these predictions, Section 2.4 documents that home mortgage lending increases and commercial mortgage lending decreases in response to GSE mortgage purchase shocks. Figure 2.9 presents complimentary evidence that GSE purchase shocks induce a transitory decrease in mortgage spreads but a short-term increase in business loan spreads. The response of mortgage spreads and business loan spreads to news shocks about GSE balance sheet expansions are estimated as in equation (2.4), but measuring the percentage point change in loan rate spreads as the dependent variable.[45] Mortgage spreads are calculated relative to the 10-year Treasury yield and business loan spreads are calculated relative to the federal funds rate, as is common practice.[46]

Mortgage spreads see a decline over 8 to 18 months that is significant at the 68% confidence level (top panel). Business loan rate spreads see an increase over the first 8 months that is significant at the 68% confidence level (bottom panel). Mortgage rates see an even larger decrease due to a decline in 10-year Trea-

[45]Twelves lags of any left-hand-side variables not included in the benchmark controls are rotated into the controls.

[46]Both classes of loans are benchmarked to risk-free interest rates closer to their respective average maturities. The most prevalent U.S. mortgage contracts are 30-year and 15-year fixed-rate mortgages, whereas the weighted-average maturity for commercial and industrial loans has averaged less than 2 years in recent decades.

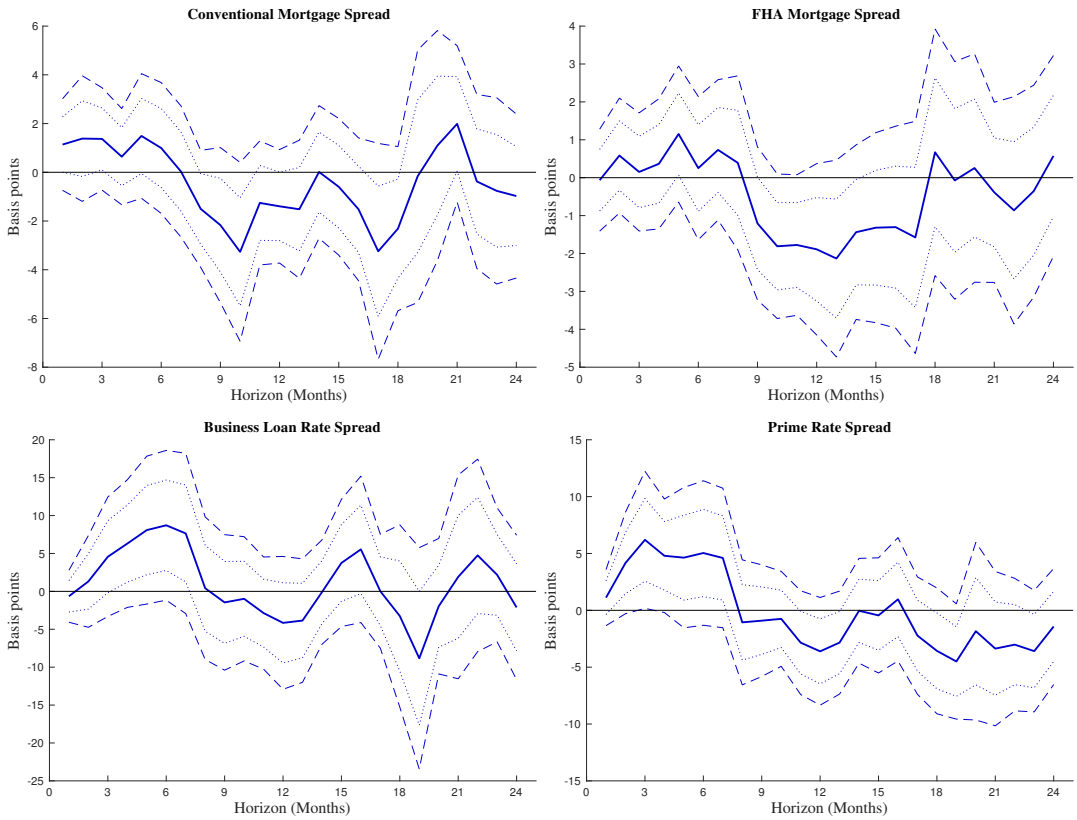

Figure 2.9. Responses of Mortgage and Business Loan Spreads to GSE Purchase Shocks

Notes: Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: see the data appendix.

sury yields (not depicted). The expansion in home mortgage lending coupled with a decrease in mortgage spreads is consistent with GSE purchases operating through a subsidy channel, with the safe asset premium on issues of agency securities being passed on in part to homeowners. The short-term increase in business loan spreads in response to GSE purchase shocks suggests that the reduction in commercial mortgage lending and C&I loan volumes is being driven by a decrease in loan supply as opposed to demand. At minimum, the evidence on borrowing costs suggest that credit reallocations are not being driven by an expansionary shock to mortgage demand or a contractionary shock to business loan demand.

A related question is whether the contraction in commercial real estate investment is driven by construction sector supply constraints as opposed to reduced commercial lending resulting from housing credit policies. If construction materials or labor supply are rather inelastic in the short run, subsidizing an increase in single-family housing demand might decrease the supply of other construction activity. If the construction sector were supply constrained, however, one would expect increased demand for new single-family homes to put upward pressure on the price of construction materials or construction sector wages. Regulatory shocks to GSE purchases have no significant effect on real average hourly earnings for construction workers or producer prices for construction materials (not depicted). Public sector construction spending is also unaffected by GSE purchase shocks, further evidence against supply-side constraints in construction.

Appendix Tables B.2 and B.3 shed light on the role of instrumentation with the regulatory events and the set of benchmark lagged controls for the main results. The role of instrumentation is particularly pronounced for the short-run for responses of variables related to GSE purchases and profitability, notably agency debt outstanding, GSE mortgage holdings, and private holdings of home mortgages. There is less of a divergence between 2SLS and OLS estimates for the response of commercial lending activity to GSE purchases. Reverse causality would be expected to arise from the GSEs and policymakers endogenously responding to housing and mortgage market conditions, not to conditions in commercial loan markets. Over longer horizons, similarities between the 2SLS and OLS estimates hinge on using an identical set of rich control variables; as the set of lagged controls is pared back, the OLS estimates increasingly diverge from the 2SLS estimates.

Appendix Tables B.4 and B.5 document that the benchmark results are robust to including alternative controls for interactions with other areas of federal policy potentially influencing mortgage lending: controls for the timing of interstate and intra-state banking deregulation, the home mortgage interest tax deduction, average marginal federal income tax rates, and conventional monetary policy innovations. Appendix Tables B.6 and B.7 document that the benchmark results are broadly robust to iteratively omitting particularly large GSE regulatory policy events from the first-stage estimates or including alternative controls related to secondary market activity, such as growth in the real conforming loan limit or GSE mortgage holdings.

Section 2.4 documents market-segmented lending responses to subsidized GSE purchase shocks. The narrative identification strategy can alternatively be interpreted as identifying housing-specific credit supply shocks from the secondary market, tying this paper to a larger literature on macroeconomic responses to credit supply shocks.[47] As another robustness check, I contrast the disparate lending responses to the housing-specific credit supply shocks with responses to a broader measure of credit shocks from that literature: the Gilchrist and Zakrajšek (2012) excess bond premium. Impulse responses to contractionary excess bond premium shocks in recursively identified SVARs show a similar decrease in commercial lending and rise in home mortgage lending, as documented in Appendix B. Broad credit supply shocks induce an endogenous expansion in GSE purchase and securitization activity, which coincide with increased home mortgage lending and single-family housing starts. Lending and construction for multifamily dwellings, conversely, see no significant response. The SVAR impulse response analysis provides complementary evidence of di-

[47] See for instance Peek, Rosengren, and Tootell (2003); Gilchrist and Zakrajšek (2012); Bassett, Chosak, Driscoll, and Zakrajsek (2014); and Mian, Sufi and Verner (2017).

vergent lending responses between housing and commercial sectors resulting from credit shocks, as well as significant real-financial linkages across housing, commercial real estate, and industrial activity.

2.7 Policy Implications

The United States is on the cusp of a sizable policy experiment that is neither well understood nor widely recognized: sharply reversing a longstanding policy stance of trying to direct credit toward residential mortgages. Figure 2.10 depicts government holdings of residential mortgage debt and its projected trajectory based on current policies for Fannie, Freddie, and the Fed. Total agency holdings are depicted as a share of residential mortgage debt (solid black), with breakouts for the portion held only by Fannie and Freddie (solid blue) as well as their portion plus the Fed's (dashed blue). Federal regulators used the conservatorship agreements to wind down the GSEs' retained mortgage holdings by roughly 70%. The Fed began unwinding its holdings of agency MBS as part of its balance sheet normalization policies in October 2017. The share of U.S. residential mortgage debt effectively residing on the federal balance sheet is slated to drop from over 26% in 2010 to just over 5%, the lowest share since the late 1960s. The sharp reversal of subsidized government funding of residential mortgages could pose a sizable credit supply shock for housing and mortgage markets.

While government ownership of mortgage debt is slated to contract, it would be premature to assume subsidized housing credit policies will soon be a relic of ages past. Congress has demonstrated a proclivity for ad hoc credit

policy interventions when mortgage rates rise and construction slows, or for repurposing secondary mortgage markets to advance new social policy objectives. GSE reform might simply shift subsidies from agency mortgage holdings toward explicit government guarantees on MBS; conversely, the administration has proposed ending conservatorship and re-privatizing the GSEs. The Fed's recent foray into housing credit policy is being wound down, but similarly may be revisited. The Federal Open Market Committee's latest policy normalization principles noted the central bank was prepared to increase purchases of agency MBS and "use its full range of tools, including altering the size and composition of its balance sheet" if the federal funds rate again proved an inadequate tool of stabilization policy.[48]

Using historical regulatory changes to infer possible effects of unwinding U.S. housing credit policies or inform GSE reform is clearly subject to the Lucas critique. That said, the conduct of U.S. housing credit policies has been far more ad hoc and less salient than other areas of federal policy likely altering household expectations and the structure of econometric models, say households adapting to systematic changes in conventional monetary policy. Moreover, it is not obvious that the anticipation of opaque mortgage subsidies (or their removal) should affect deep parameters of agents' behavior in a structural model, whereas offered mortgage rates will clearly affect household behavior. The Lucas critique notwithstanding, evidence on the historical effects of shocks to subsidized GSE mortgage purchases offers some guidance, taken with a grain of salt, to possible effects of the Fed unwinding its mortgage holdings. Similarly,

[48]See FOMC Press Release, Addendum to the Policy Normalization Principles and Plans, June 14, 2017. Barring new legislation, the Fed's open market operations will remain restricted to transacting in either Treasuries or agency securities. The Interest Rate Adjustment Act of 1966 authorized the Fed to conduct open market operations in any direct or fully guaranteed obligation "of any agency of the United States," which was made permanent in 1968; see Haltom and Sharp (2014).

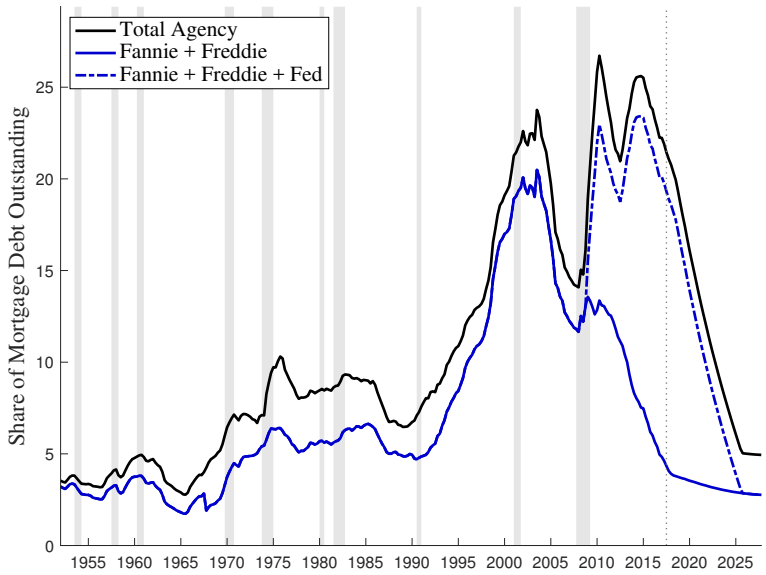

Figure 2.10. Actual and Projected Mortgage Holdings of Government Agencies

Notes: Gray bars correspond with NBER recession dates. Vertical dotted line corresponds to beginning of forecasts for agency mortgage holdings and residential mortgage debt. Residential mortgage debt growth is forecast using an estimated VAR system and the Congressional Budget Office's Economic Outlook forecast. Other agencies funding mortgages include the FHLBanks, Ginnie Mae, Federal Housing Administration, Veterans Administration, Farmers Home Administration, Federal Deposit Insurance Corporation, and Federal Land Banks. Sources: see the data appendix.

macroeconometric evidence can inform what set of historical tradeoffs policymakers might want to consider when overhauling secondary mortgage markets and the degree to which the federal government subsidizes mortgage borrowing.

2.7.1 Policy Implications: Balance Sheet Normalization

Evidence on the transmission of GSE mortgage purchases is relevant to the Fed's large-scale purchases of agency MBS. The Fed's MBS purchases are an unconventional form of housing credit policy, not merely unconventional monetary policy. Whereas the Fed's purchases of long-term Treasuries directly target the

term structure of risk-free interest rates, the stated objective behind the Fed's MBS purchases was to "reduce the cost and increase the availability of credit for the purchase of houses."[49] The Federal Open Market Committee was publicly rebuked for inappropriately foraying into the realm of credit policy by several regional Fed presidents; for instance, Charles Plosser, then President of the Philadelphia Fed, argued

> "when the Fed engages in targeted credit programs that seek to alter the allocation of credit across markets, I believe it is engaging in fiscal policy and has breached the traditional boundaries established between the fiscal authorities and the central bank" (Plosser, 2012).[50]

While the Fed's MBS purchases were seen as a departure from past monetary policy, Congress has engaged in large-scale purchases of mortgage debt on and off since the Great Depression. Evidence on the aggregate effects and persistence of responses to exogenous GSE purchase shocks can help inform likely effects of unwinding the Fed's sizable holdings of mortgage debt, circumventing intrinsic limitations in study designs used to analyze the high-frequency or relative effects of the Fed's purchases during the crisis.[51] There are consid-

[49] See FOMC Press Release, November 25, 2008.

[50] Jeffrey Lacker, then President of the Richmond Fed, similarly warned "Buying MBS in large quantities is intended to reduce borrowing rates for conforming home mortgages, and thereby provide support to that recovering market. However, it necessarily does so only by reducing rates for borrowers in other markets by less than would be the case if purchases were confined to U.S. Treasury securities. Therefore, by purchasing MBS, the Fed is attempting to tilt the flow of credit toward one particular economic sector... the Fed's actions risk distorting credit allocation and depriving some sectors of the credit they deserve" (Lacker, 2012).

[51] Quantifying the macroeconomic effects of the Fed's MBS purchase program faces numerous intrinsic complications: there were relatively few policy interventions or related announcements, purchases were endogenously motivated by economic distress, and policy announcements about MBS purchases were often coupled with news about purchases of Treasuries or forward guidance regarding short-term rates. Consequently, the literature has largely focused on high-frequency event studies around policy announcements or event studies exploiting cross-sectional variation across bank balance sheets or mortgage contracts. High-frequency regres-

erable similarities between the Fed's MBS purchases and the GSEs' mortgage purchases. As with the GSEs' purchases, the Fed's purchases of mortgage debt pull credit, prepayment, and interest rate risk from the private sector. The Fed's MBS purchases similarly subsidize mortgage credit, either relative to only purchasing Treasuries or in terms of a funding advantage over banks. Funding mortgage purchases with the issuance of either reserves or agency bonds involves the creation of safe assets. There are significant similarities between the market structures for the Fed's MBS purchases in the to-be-announced (TBA) forward market and the GSEs' purchases: both market structures are geared toward newly originated conforming mortgages meeting recently set parameters and afford an option on new mortgage originations.[52]

Moreover, there is a growing body of empirical evidence that the Fed's MBS purchases and GSEs' purchases operate through a similar mortgage origination channel. Fuster and Willen (2010); Di Maggio, Kermani, and Palmer (2016); Chakraborty, Goldstein, and MacKinlay (2017); and Rodnyansky and Darmouni (2018) find cross-sectional evidence of the Fed's MBS purchases increasing conforming mortgage originations and refinancing activity, attributed to lowered

sion discontinuities are naturally confined to studying the intraday or interday movement of financial variables, and cannot readily speak to aggregate effects or persistence. This literature predominantly finds evidence of announcements regarding MBS purchases decreasing long-term bond yields and MBS spreads. See, for instance, Gagnon et al. (2011), Krishnamurthy and Vissing-Jørgensen (2011), and Hancock and Passmore (2011, 2015). Cumulating responses over a larger sample of Fed events, Greenlaw et al. (2018) contend that initial rate responses to such policy announcements were not persistent. Cross-sectional difference-in-differences regressions can speak to relative effects for a broader range of dependent variables, but similarly cannot speak to aggregate effects or persistence. High-frequency and cross-sectional evidence from the crisis is also ill-suited to informing likely effects of the Fed arresting its MBS purchases near the peak of the business cycle.

[52]The Fed's purchases have been heavily concentrated in newly issued 30-year fixed-rate agency MBS acquired through the TBA market (Gagnon et al., 2011). In this market, parameters for maturity, coupon, price, par volume, issuer, and settlement date for the traded security are agreed upon in advance, but the pool of mortgages delivered to the purchaser is only revealed near settlement, typically one to three months after the trade date (Vickery and Wright, 2013).

mortgage rates, increased market liquidity, and removal of lending risks from the private sector. Fieldhouse, Mertens, and Ravn (2018) similarly find large mortgage origination responses ensuing from agency mortgage purchases, particularly for refinancing. Chakraborty, Goldstein, and MacKinlay (2017) find evidence of banks with greater exposure to the Fed's MBS purchases both increasing mortgage originations and decreasing C&I lending relative to banks with less exposure. I document analogous crowd-out effects for aggregate C&I lending in response to GSE purchase shocks, as well as crowd out of private multifamily mortgage and commercial mortgage lending.

After the Fed terminated its QE3 MBS purchases in 2014, the system's holdings of mortgage debt hovered around $1.75 trillion for the next three years, resulting from a policy of reinvesting principal payments back into new agency MBS, as seen in the left panel of Appendix Figure B.2. The Fed's MBS reinvestment purchases amounted to buying 15–17% of the flow of residential mortgage originations in recent years. The Fed ceased agency MBS reinvestments in October 2018. While the Fed's balance sheet normalization program was anticipated, the transmission of purchases affecting lending through a mortgage origination channel will not have simply been priced in already.[53] Fieldhouse, Mertens, and Ravn (2018) find that a one percentage point increase in agency purchases as a share of mortgage originations reduces mortgage spreads by 2 to 3 basis points roughly one year after policy announcements, while housing starts increase 1% to 2%. If those responses were to scale linearly to phasing out the Fed's reinvestments, they would imply a gradual 30 to 45 basis point rise in mortgage spreads and a 15 to 30% reduction in housing investment. The sharp 15 percentage point

[53]High-frequency studies may underestimate the effects of the Fed's purchases by focusing solely on news effects. Hancock and Passmore (2015) find the initiation of the Fed's MBS purchases produced further improvements in market functioning.

reduction in the share of originations purchased by the Fed might thus be expected to significantly drag on housing and mortgage markets, and perhaps the economy more broadly.[54]

If, however, reduced Fed demand for newly originated mortgages induces a reallocation of credit through bank lending channels, the macroeconomic effects of balance sheet normalization may be muted and largely redistributive. The credit and construction multipliers estimated in Sections 2.4 and 2.5 suggest that balance sheet normalization will drag on single-family housing and mortgage markets, but likely exert positive spillovers for commercial lending and leave employment unaffected. The results of Chakraborty, Goldstein, and MacKinlay (2017) would similarly predict a relative increase in commercial loan growth for banks with more exposure to the Fed's purchases. There is no satisfactory way of benchmarking my estimates of aggregate C&I loan crowd-out from GSE purchases to the relative C&I loan crowd-out from the Fed's MBS purchases documented by Chakraborty, Goldstein, and MacKinlay (2017). As an alternative crosswalk, Appendix B estimates the response of C&I lending to the Fed's MBS purchases in a LP-OLS regression framework; the point estimates show a 10- to 25-cent reduction in C&I lending per dollar of the Fed's MBS purchases, in line with my LP-IV estimates of C&I loan crowd-out per dollar of GSE purchases. This again suggests that phasing out the Fed's MBS holdings will largely reallocate credit and real activity across sectors, likely inducing a substitution toward commercial real estate lending and related construction.

Recent economic data seems consistent with housing credit policies predominantly reallocating activity toward housing without stimulating aggregate ac-

[54]Leamer (2007); Leamer (2015) argues that the U.S. business cycle is predominantly a consumer cycle governed by housing investment; 9 of 11 post-war recessions have been led by deteriorations in housing, and all but two housing slumps have preceded recessions.

tivity. The residential housing market softened as the Fed phased out its subsidized purchases of agency MBS over October 2017 to October 2018. Mortgage spreads rose 22 basis points over October 2017–October 2018. Housing starts hit inflection point in January 2018 and have since fallen 10%. New home sales and existing home sales peaked in November 2017, and the latter have similarly dropped 10%. The Fed's latest Senior Loan Officer Opinion Survey reported strengthening demand for C&I loans but weakening demand for residential real estate and construction loans.[55] The Fed's rate tightening cycle is also surely contributing to the weakening housing market but not to the rise in mortgage spreads, and other leading economic indicators remain strong. Annual growth in construction sector employment has accelerated, reaching a two-year high in October 2018. Weakening housing market activity notwithstanding, my findings on crowd-out effects from housing credit policies bode well for the Fed's ongoing reduction in its mortgage holdings, particularly for total construction spending and employment.

2.7.2 Policy Implications: GSE Reform and Future Research

Congress, to its own chagrin, has yet to resolve the fate of Fannie and Freddie more than a decade after they were taken into federal conservatorship. The last major bipartisan push at GSE reform fizzled in 2014, but neither Congress nor the administration is fond of the status quo. The pre-crisis GSE model of privatized upside gains with catastrophic losses borne by taxpayers remains widely maligned a decade after catastrophic losses erupted. A new bipartisan GSE reform bill was introduced in the House Financial Services Committee in Septem-

[55] Senior Loan Officer Opinion Survey on Bank Lending Practices, July 2018.

ber 2018. While the GSEs' retained portfolios have been shrunk significantly, their MBS guarantee books have been allowed to grow without limit, and they remain behemoths of U.S. mortgage finance; the GSEs own or guarantee over 42% of U.S. residential mortgage debt.[56] Some form of government-sponsored secondary market will surely persist so long as Congress remains wedded to 30-year fixed-rate mortgages with a prepayment option. It is beyond the scope of this paper to weigh the wisdom of that entrenched preference, but it will surely shape reforms to the GSE model and U.S. housing credit policies.[57]

One leading contender on Capital Hill is replacing the GSEs with a system of bank-issued MBS explicitly guaranteed by the Treasury, but with private capital absorbing the first 10% of losses.[58] The proposal would reinstate a version of privatized gains with risks backstopped by the Treasury. The other leading contender in Congress is replacing the GSEs with an expanded role for government-owned Ginnie Mae: Ginnie would additionally guarantee pools of privately insured conventional mortgages in exchange for fees, with the Treasury absorbing net earnings and backstopping credit risk.[59] Conversely, Congress could rescind conservatorship and recharter the GSEs as private entities notionally severed from an implicit government guarantee, as the administration recently proposed (OMB, 2018). If legislative reforms continue to stall, administrative reforms might instead be used to shrink the GSEs' market footprint by reducing the conforming loan limit, tightening underwriting standards, and raising MBS

[56]Looking at flows, roughly 70% of mortgages originated in 2017 were backed by Fannie, Freddie, or Ginnie (OMB, 2018).

[57]For instance, in outlining priorities for housing credit policy reform in 2013, President Barack Obama emphasized that any legislation "*should preserve access to safe and simple mortgage products like the 30-year, fixed-rate mortgage*" (Obama, 2013).

[58]Such a proposal drafted by Senator Mark Crapo and Senator Tim Johnson passed the Senate Banking Committee in 2014.

[59]A bipartisan bill sponsored by Representative Jeb Hensarling and Representative John Delaney proposed such a model in September 2018, and Senator Bob Corker and Senator Mark Warner recently proposed a similar Ginnie model of GSE reform.

guarantee fees (Parrott and Zandi, 2018).

While Congress has fixated on market structure and downside losses, the elephant in the room remains the extent to which mortgage debt will be subsidized in the next iteration of secondary markets. GSE reform might curtail the subsidization of mortgages via implicitly guaranteed agency bonds only to increase subsidization by underpricing risk on explicitly guaranteed MBS. Dynamic responses to GSE purchase shocks suggest that housing policy objectives can be advanced through a subsidy channel, while the subsidized expansion of mortgage lending unintentionally crowds out commercial lending through credit supply and bank lending channels. Underpriced guarantees can likely advance Congress's various housing policy objectives through a subsidy channel, but may induce a varying degree of credit crowd out. Guarantees leave interest rate risk borne by the private sector, potentially driving a smaller wedge in marginal origination incentives and weakening the mortgage origination channel of housing credit policies. Prepayment risk may render agency MBS a weaker substitute to bank debt than noncallable agency bonds, altering portfolio rebalancing effects through the safe asset supply channel. A complementary empirical analysis of the macroeconomic effects of government mortgage guarantees is left for future research. Regardless, policymakers should weigh the opportunity costs of subsidizing mortgage debt, notably fiscal costs to taxpayers, horizontal inequities between homeowners and renters, and crowd-out of nontargeted lending and real activity; overhauling budget scorekeeping rules that understate the net present value of credit subsidies would help (Lucas, 2016).

Another lingering policy question is the extent to which countercyclical GSE activity has served as an automatic stabilizer for housing across the business cy-

cle. Fannie and Freddie have been a countercyclical source of funding for mortgage intermediation, and entirely replacing their mortgage holdings with guarantees may have significant implications for mortgage and housing markets during credit crunches. The SVAR impulse response analysis in Appendix B provides evidence of an endogenous expansion of secondary mortgage market activity in response to broad-based credit supply shocks, and mortgage lending and housing starts see a similar countercyclical response. A comprehensive analysis of the historical contribution of GSE purchase and securitization activity in stabilizing mortgage flows and housing activity across the business cycle is a related work in progress (Fieldhouse, 2018).

2.8 Concluding Remarks

As a matter of theory, credit policies can expand targeted lending volumes through subsidies and guarantees. In the presence of credit frictions or an inelastic supply of savings, however, credit policies stimulating a targeted form of lending may inadvertently ration credit away from other uses. While the potential for credit policies to crowd out lending has broad, long-standing theoretical backing, quantifying such credit reallocations in calibrated models is highly sensitive to assumptions about the supply of credit (Gale, 1991; Lucas, 2016). Exploiting exogenous variation in the mortgage holdings of Fannie and Freddie, I document evidence of U.S. housing credit policies reallocating credit away from commercial lending. My identification strategy can speak to real-financial linkages of housing credit policies, unlike related partial equilibrium models of the effects of federal credit policies. I find that the reallocation of credit ensuing from regulatory shocks to GSE purchases maps to a related real-

location of construction activity across sectors.

Federal policymakers have shown a proclivity for ad hoc uses of credit policies, particularly during periods of financial distress. With their past conduct of housing credit policies via secondary markets, policymakers appear capable of increasing home mortgage lending and stimulating single-family housing investment, as intended, through a subsidy channel. These partial equilibrium effects, however, are effectively offset in general equilibrium by unintended reallocations arising from an imperfectly elastic supply of bank loans. Housing credit policies appear broadly neutral for total construction spending and employment, casting doubt on the efficacy of their use as stabilization policies, as was common up through the 1980s and again during the Great Recession. Evidence of a zero sum nature of U.S. housing credit policies should serve as a cautionary tale to policymakers for their use of credit policy and housing subsidies more broadly. If subsidizing an expansion in mortgage borrowing crowds out commercial lending because of a partially inelastic supply of bank loans, the home mortgage interest deduction may induce similar credit crowd out.

While my empirical strategy is well suited to quantifying credit and real reallocations, a drawback is the inability to speak to welfare. Credit policies are often justified in terms of correcting market failures (Elliott, 2011), and increase welfare in some adverse selection models of credit rationing (Smith, 1983; Gertler and Kiyotaki, 2010; Lucas, 2016). Yet credit policies are distortionary and, under different assumptions about contracting frictions and the functioning of capital markets, are found to decrease welfare, particularly when accounting for fiscal costs (Gale, 1991; Williamson, 1994). Fiscal costs aside, the theory of the second best seems a reasonable framework for thinking about credit poli-

cies. Would market failures under-allocate credit to housing without federal credit policy interventions? Perhaps at times, say when housing credit policies were first launched during the 1930s, or when the Fed launched QE1 in 2008. That seems far less likely during 1990s and early 2000s, when Fannie and Freddie were allowed to rapidly expand, likely contributing to the housing bubble through a subsidy channel. Subsidizing mortgages may reap political rewards, but is by no means necessary for supporting mortgage liquidity via secondary markets. While reversing the longstanding stance of subsidized housing credit policies might increase welfare, it surely would not be a Pareto improvement: housing credit policies create winners and losers, as would unwinding them.

BIBLIOGRAPHY

Bassett, William F., Mary Beth Chosak, John C. Driscoll, and Egon Zakrajšek. 2014. "Changes in Bank Lending Standards and the Macroeconomy." *Journal of Monetary Economics*, 62 (1): 23–40.

Bachasy, Natalie, Olivia S. Kimz, and Constantine Yannelis. 2019. "Loan Guarantees and Credit Supply." University of Chicago working paper.

Bernanke, Ben S. and Alan S. Blinder. 1988. "Credit, Money, and Aggregate Demand." *American Economic Review*, 78 (2): 435–439.

Bernanke, Ben S. and Alan S. Blinder. 1992. "The Federal Funds Rate and the Channels of Monetary Transmission." *American Economic Review*, 82 (4): 901–921.

Bernanke, Ben S. and Mark Gertler. 1989. "Agency Costs, Net Worth and Business Fluctuations." *American Economic Review*, 79 (1): 14–31.

Bhutta, Neil, Steven Laufer, and Daniel R. Ringo. 2017. "Residential Mortgage Lending in 2016: Evidence from the Home Mortgage Disclosure Act Data." *Federal Reserve Bulletin*, 103 (6): 1–27.

Black, Lamont K., Diana Hancock, and Wayne Passmore. 2010. "The Bank Lending Channel of Monetary Policy and its Effect on Mortgage Lending." Board of Governors of the Federal Reserve System Finance and Economics Discussion Series No. 2010–39.

Chakraborty, Indraneel, Itay Goldstein, and Andrew MacKinlay. 2017. "Monetary Stimulus and Bank Lending." University of Pennsylvania working paper.

Chakraborty, Indraneel, Itay Goldstein, and Andrew MacKinlay. 2018. "Housing Price Booms and Crowding-Out Effects in Bank Lending." *Review of Financial Studies*, 31 (7): 2806–2853.

Cloyne, James. 2013. "Discretionary Tax Changes and the Macroeconomy: New Narrative Evidence from the United Kingdom." *American Economic Review*, 103 (4): 1507–1528.

Cloyne, James and Patrick Hürtgen. 2016. "The Macroeconomic Effects of Monetary Policy: A New Measure for the United Kingdom." *American Economic Journal: Macroeconomics*, 8 (4): 75–102.

Congressional Budget Office (CBO), 2012, "Fair-Value Accounting for Federal Credit Programs." Issue Brief. Washington, D.C.

Di Maggio, Marco and Amir Kermani. 2017. "Credit-Induced Boom and Bust." *Review of Financial Studies*, 30 (11): 3711–3758.

Di Maggio, Marco, Amir Kermani, and Christopher Palmer. 2016. "How Quantitative Easing Works: Evidence on the Refinancing Channel." NBER Working Paper No. 22638.

Eckstein, Otto and Allen Sinai. 1986. "The Mechanisms of the Business Cycle in the Postwar Era." *The American Business Cycle: Continuity and Change*, Robert J. Gordon, ed. (Chicago, IL: NBER and The University of Chicago Press).

Elliott, Douglas J. 2011. *Uncle Sam in Pinstripes: Evaluating U.S. Federal Credit Programs*. Brookings Institution Press: Washington, D.C.

Fieldhouse, Andrew J. and Karel Mertens. 2017. "A Narrative Analysis of Mortgage Asset Purchases by Federal Agencies." NBER Working Paper No. 23165.

Fieldhouse, Andrew J., Karel Mertens, and Morten O. Ravn. 2018. "The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar U.S. Housing Credit Policy." *Quarterly Journal of Economics*, 133 (3): 1503–1560.

Fieldhouse, Andrew J. 2018. "Government-sponsored Secondary Mortgage Markets: Automatic Stabilizer for Housing?" Cornell University manuscript.

Friedman, Milton and Anna J. Schwartz. 1963. *A Monetary History of the United States, 1867-1960*. Princeton University Press: Princeton, NJ.

Friedman, Milton and Anna J. Schwartz. 1963. "Money and Business Cycles." *Review of Economics and Statistics*, 45 (1): 32–64.

Fuster, Andreas and Paul S. Willen. 2010. "$1.25 Trillion Is Still Real Money: Some Facts about the Effects of the Federal Reserve's Mortgage Market Investments." Federal Reserve Bank of Boston Public Policy Discussion Paper No. 10–04.

Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian Sack. 2011. "The Financial Market Effects of the Federal Reserve's Large-Scale Asset Purchases." *International Journal of Central Banking*, 7 (1): 3–43.

Gale, William G. 1991. "Economic Effects of Federal Credit Programs." *American Economic Review*, 81 (1): 133–152.

Gertler, Mark and Nobuhiro Kiyotaki. 2010. "Financial Intermediation and Credit Policy in Business Cycle Analysis." *Handbook of Monetary Economics*, Volume 3A, Benjamin M. Friedman and Michael Woodford, eds. (San Diego, CA: North-Holland).

Gertler, Mark and Peter Karadi. 2015. "Monetary Policy Surprises, Credit Costs, and Economic Activity." *American Economics Journal: Macroeconomics*, 7 (1): 44–76.

Gilchrist Simon, Vladimir Yankov, and Egon Zakrajšek. 2009. "Credit Market Shocks and Economic Fluctuations: Evidence from Corporate Bond and Stock Markets." *Journal of Monetary Economics*, 56 (4): 471–493.

Gilchrist, Simon and Egon Zakrajšek. 2012. "Credit Spreads and Business Cycle Fluctuations." *American Economic Review*, 102 (4): 1692–1720.

Gorton, Gary, Stefan Lewellen and Andrew Metrick. 2012. "The Safe-Asset Share." *American Economic Review*, 102 (3): 101–106.

Greenlaw, David, James D. Hamilton, Ethan Harris, and Kenneth D. West. 2018. "A Skeptical View of the Impact of the Fed's Balance Sheet." NBER Working Paper No. 24687.

Haltum, Renee and Robert Sharp. 2014. "The First Time the Fed Bought GSE Debt." Federal Reserve Bank of Richmond Economic Brief No. 14–04.

Hamilton, James D. 1983. "Oil and the Macroeconomy since World War II." *Journal of Political Economy*, 91 (2): 228–248.

Hamilton, James D. 2018. "Why You Should Never Use the Hodrick-Prescott Filter." *Review of Economics and Statistics*, forthcoming.

Hancock, Diana and Wayne Passmore. 2011. "Did the Federal Reserve's MBS Purchase Program Lower Mortgage Rates?" *Journal of Monetary Economics*, 58 (5): 498–514.

Hancock, Diana and Wayne Passmore. 2015. "How Does the Federal Reserve's Large-Scale Asset Purchases Influence Mortgage-Backed Securities Yields and US Mortgage Rates." *Real Estate Economics*, 43 (4): 855–890.

Iacoviello, Matteo and Raoul Minetti. 2008. "The Credit Channel of Monetary Policy: Evidence from the Housing Market." *Journal of Macroeconomics*, 30 (1): 69–96.

Jordà, Oscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review*, 95 (1): 161–182.

Justiniano, Alejandro, Giorgio E. Primiceri, and Andrea Tambalotti. 2017. "The Mortgage Rate Conundrum." NBER Working Paper No. 23784.

Kashyap, Anil K. and Jeremy C. Stein. 1994. "Monetary Policy and Bank Lending." *Monetary Policy*, N. Gregory Mankiw, ed. (Chicago, IL: University of Chicago Press).

Kashyap, Anil K. and Jeremy C. Stein. 1995. "The Impact of Monetary Policy on Bank Balance Sheets." *Carnegie-Rochester Conference Series on Public Policy*, 42 (1995): 151–195.

Kashyap, Anil K. and Jeremy C. Stein. 2000. "What Do a Million Observations on Banks Say About the Transmission of Monetary Policy?" *American Economic Review*, 90 (3): 407–428.

Kilian, Lutz. 2008. "Exogenous Oil Supply Shocks: How Big Are They and How Much Do They Matter for the U.S. Economy?" *The Review of Economics and Statistics*, 90 (2): 216–240.

Kilian, Lutz and Helmut Lütkepohl. 2017. *Structural Vector Autoregressive Analysis*. Cambridge University Press, New York, NY.

Kiyotaki, Nobuhiro and John Moore. 1997. "Credit Cycles." *Journal of Political Economy*, 105 (2): 211–248.

Krishnamurthy, Arvind and Annette Vissing-Jørgensen. 2011. "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy." *Brookings Papers on Economic Activity*, 2011 (2): 215–265.

Krishnamurthy, Arvind and Annette Vissing-Jørgensen. 2012. "The Aggregate Demand for Treasury Debt." *Journal of Political Economy*, 120 (2): 233–267.

Lacker, Jeffrey M. 2012. "President's Message: The Dangers of the Fed Conducting Credit Policy." *Region Focus*, 16 (4): 1.

Leamer, Edward E. 2007. "Housing IS the Business Cycle." NBER Working Paper No. 13428.

Leamer, Edward E. 2015. "Housing Really IS the Business Cycle: What Survives the Lessons of 2008-09?" *Journal of Money, Credit, and Banking*, 47 (1): 43–50.

Lehnert, Andreas, Wayne Passmore, and Shane M. Sherlund. 2008. "GSEs, Mortgage Rates, and Secondary Market Activities." *Journal of Real Estate Finance and Economics*, 36 (3) 343–363.

Lucas, Deborah J. 2016. "Credit Policy as Fiscal Policy." *Brookings Papers on Economic Activity*, 2016 (1): 1–41.

Mertens, Karel. 2008. "Deposit Rate Ceilings and Monetary Transmission in the U.S." *Journal of Monetary Economics*, 55 (7): 1290–1302.

Mertens, Karel and Morten O. Ravn. 2013. "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States." *American Economic Review*, 103 (4): 1212–1247.

Mertens, Karel and José Luis Montiel Olea. 2018. "Marginal Tax Rates and Income: New Time Series Evidence." *Quarterly Journal of Economics*, 133 (4): 1803–1884.

Mian, Atif, Amir Sufi, and Emil Verner. 2017. "How Do Credit Supply Shocks Affect the Real Economy? Evidence from the United States in the 1980s." NBER Working Paper No. 23802.

Newey, Whitney K. and Kenneth D. West. 1987. "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, 55 (3): 703–708.

Obama, Barack H. 2013. "Remarks by the President on Responsible Homeownership." The White House, Office of the Press Secretary, August 6.

Office of Management and Budget. 2018. "Delivering Government Solutions in the 21st Century: Reform Plan and Reorganization Recommendations." Executive Office of the President of the United States, Washington, DC.

Parrott, Jim and Mark M. Zandi. 2018. "GSE Reform Is Dead – Long Live GSE Reform!" Urban Institute Brief, May 9.

Passmore, S. Wayne. 2005. "The GSE Implicit Subsidy and the Value of Government Ambiguity." *Real Estate Economics*, 33 (3): 465–486.

Passmore, S. Wayne, Shane M. Sherlund, and Gillian Burgess. 2005. "The Effect of Housing Government-Sponsored Enterprises on Mortgage Rates." *Real Estate Economics*, 33 (3): 427–463.

Peek, Joe, Eric S. Rosengren, and Geoffrey M.B. Tootell. 2003. "Identifying the Macroeconomic Effects of Loan Supply Shocks." *Journal of Money, Credit, and Banking*, 35 (6): 931–946.

Plosser, Charles I. 2012. "Fiscal Policy and Monetary Policy: Restoring the Boundaries." Speech at the U.S. Monetary Policy Forum, The Initiative on Global Markets, University of Chicago Booth School of Business, February 24.

Ramey, Valerie A. and Matthew D. Shapiro. 1998. "Costly Capital Reallocation and the Effects of Government Spending." *Carnegie-Rochester Conference Series on Public Policy*, 48 (1998): 145–194.

Ramey, Valerie A. 2011. "Identifying Government Spending Shocks: It's All in the Timing." *Quarterly Journal of Economics*, 126 (1): 10–50.

Ramey, Valerie A. 2016. "Macroeconomic Shocks and Their Propagation." *Handbook of Macroeconomics*, Volume 2A, John B. Taylor and Herald Uhlig, eds. (San Diego, CA: North-Holland).

Ramey, Valerie A. 2016. "Defense News Shocks, 1889–2015: Estimates Based on News Sources." University of California, San Diego manuscript.

Ramey, Valerie A. and Sarah Zubairy. 2017. "Government Spending Multipliers in Good Times and Bad: Evidence from U.S. Historical Data." *Journal of Political Economy*, 126 (2): 850–901.

Rodnyansky, Alexander and Olivier M. Darmouni. 2018. "The Effects of Quantitative Easing on Bank Lending Behavior." *Review of Financial Studies*, 30 (11): 3858–3887.

Romer, Christina D. and David H. Romer. 1989. "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz." *NBER Macroeconomics Annual 1989*, Volume 4, Olivier Jean Blanchard and Stanley Fischer, eds. (Cambridge, MA: The MIT Press).

Romer, Christina D. and David H. Romer. 2004. "A New Measure of Monetary Shocks: Derivation and Implications." *American Economic Review*, 94 (4): 1055–1084.

Romer, Christina D. and David H. Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review*, 100(3): 763–801.

Rose, Jonathan D. 2011. "The Incredible HOLC? Mortgage Relief during the Great Depression." *Journal of Money, Credit and Banking*, 43(6): 1073–1107.

Sharpe, Steve A. and Shane M. Sherlund. 2016. "Crowding Out Effects of Refinancing on New Purchase Mortgages." *Review of Industrial Organization*, 48 (2): 209–239.

Shumway, Robert H. and David S. Stoffer. 1982. "An Approach to Time Series Smoothing and Forecasting Using the EM Algorithm." *Journal of Time Series Analysis*, 3 (4): 253–264.

Smith, Bruce, 1983, "Limited Information, Credit Rationing, and Optimal Government Lending Policy", *American Economic Review*, 73 (3): 305–318.

Stein, Jeremy C. 1998. "An Adverse-Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy." *RAND Journal of Economics*, 29 (3): 466–486.

Stiglitz, Joseph E. and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review*, 71 (3): 393–410.

Stock, James H. and Mark W. Watson. 2018. "Identification and Estimation of Dynamic Causal Effects in Macroeconomics." *Economic Journal*, 128 (610): 917–948.

Vickery, James and Joshua Wright. 2013. "TBA Trading and Liquidity in the Agency MBS Market." Federal Reserve Bank of New York Economic Policy Review, May.

Williamson, Stephen D. 1994. "Do Informational Frictions Justify Federal Credit Programs?" *Journal of Money, Credit and Banking*, 26 (3): 523–544.

CHAPTER 3

A NARRATIVE ANALYSIS OF MORTGAGE ASSET PURCHASES BY FEDERAL AGENCIES*

Andrew J. Fieldhouse and Karel Mertens

Abstract: This paper provides a narrative analysis of regulatory policy changes affecting the purchases and holdings of mortgages and related securities of five US government entities over the 1968–2014 period. We focus on federal government policies that aim to influence the allocation and/or supply of residential mortgage credit. We use contemporary primary sources and various institutional histories to identify significant policy interventions, to document their economic and regulatory context, surrounding motives, and pertinent timing, as well as to quantify projected impacts on agencies' mortgage holdings. Finally, we classify each significant policy change as either 'cyclically motivated' or 'non-cyclically motivated.' The results of the narrative analysis of federal housing credit policy changes yield a record of events that can be used as an instrumental variable for agency purchase activity.

*For a final version of this paper, visit: `https://www.nber.org/papers/w23165`

Citation: Fieldhouse, Andrew J. and Karel Mertens. 2017. "A Narrative Analysis of Mortgage Asset Purchases by Federal Agencies," NBER Working Paper No. 23165.

3.1 Introduction

This paper provides a narrative analysis of regulatory policy changes affecting the purchases and holdings of mortgages and related securities of five US government entities. We focus on federal government policies that aim to influence the allocation and/or supply of residential mortgage credit. We use contemporary primary sources and various legislative and institutional histories to identify significant policy changes expected to affect government agencies' permissible volumes of commitments to purchase mortgages, net purchases, and retained mortgage portfolios. We quantify the projected impact of each policy change on agencies' ability to purchase mortgage assets using ex ante balance sheet data and estimates of congressional staff, market analysts, regulators, and agency executives. We use an array of primary sources to document the economic and regulatory context of each major policy change, including the timing of policy events being announced and taking effect, as well as purported and discerned motives. Each significant policy change affecting agencies' retained mortgage portfolios is then classified as either 'cyclically motivated' or 'non-cyclically motivated' for those policies deemed unrelated to contemporaneous changes in the business cycle and housing credit conditions.

The documentation, quantification, dating, and classification of federal housing credit policy interventions is intended to yield an input for studying their use and impact. In a companion paper, Fieldhouse, Mertens, and Ravn (2017), we use the policy changes and narrative classification to analyze the impact of government mortgage purchases on mortgage lending, interest rates, residential investment, home prices, homeownership, the stance of monetary policy, and other financial indicators and macroeconomic aggregates.

We focus on five government agencies that have actively participated in mortgage asset markets: the Federal National Mortgage Association (FNMA, or Fannie Mae), Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac), Government National Mortgage Association (GNMA, or Ginnie Mae), Federal Reserve, and US Treasury Department. We restrict our focus of interest for significant policy changes to 1968–2014, a period of relative institutional stability in secondary mortgage markets. A historical overview of US federal housing credit policy provides background and context for these individual policy changes, and the history of Fannie Mae is traced back to its Great Depression origins in an accompanying online appendix for broader context regarding its charter, public mission, and the evolution of housing credit policy.

The remainder of the paper is structured as follows. Section 3.2 provides a historical overview of US federal housing credit policy institutions and trends. Section 3.3 outlines the methodologies and principal data sources used in compiling the narrative histories of the relevant agencies and policy changes. Section 3.4 offers a chronological narrative analysis relating to the purchases of mortgage assets for each of the five agencies. Section 3.5 presents the end result of the narrative analysis, which consists of a time series of significant federal housing credit policy innovations, along with our projected annualized impact on each agency's mortgage holdings (in nominal dollars), determination of the policy change's pertinent timing as a news shock about pending purchases, and classification of the policy as either cyclically or non-cyclically motivated.

3.2 Historical Overview of US Federal Housing Credit Policy

To provide broader context for the discussion of each agency's significant policy changes, we first overview the origins and evolution of US federal housing credit policy and the housing agencies of interest. As a reference, Table 3.1 lists the major housing credit policy institutions and their years active, and Table 3.2 provides a glossary of all acronyms used in this paper.

Table 3.1: Principal Institutions of US Housing Credit Policy

FDIC	Federal Deposit Insurance Corporation	1933-
FHA	Federal Housing Administration	1934-
FHFA	Federal Housing Finance Agency	2008-
FHFB	Federal Housing Finance Board	1989-2008
FHLBB	Federal Home Loan Bank Board	1932-1989
FHLBS	Federal Home Loan Bank System	1932-
FHLMC	Federal Home Loan Mortgage Corporation	1970-
FNMA	Federal National Mortgage Association	1938-
FSLIC	Federal Savings and Loan Insurance Corporation	1934-1989
GNMA	Government National Mortgage Association	1968 -
HOLC	Home Owners' Loan Corporation	1933-1954
HUD	Department of Housing and Urban Development	1965-
OFHEO	Office of Federal Housing Enterprise Oversight	1992-2008
PHA	Public Housing Administration	1937-1965
RFC	Reconstruction Finance Corporation	1932-1957
RFCMC	RFC Mortgage Company	1935-1948
RTC	Resolution Trust Corporation	1989-1995
VA	Veterans Administration/Department of Veterans Affairs	1944-

The origins of present day US federal housing credit policy stem from policy responses intended to ameliorate the collapse of mortgage credit and resuscitate the housing market during the Great Depression. The Depression was led by a sharp and sustained downturn in housing starts, which plunged from a peak of over 900,000 in 1925 to 500,000 by 1929 and a low of under 100,000 in 1933, having dropped 90% (Leamer (2007), Eichengreen (2015)). The stock market crash of 1929 had been preceded by a speculative residential real estate development

boom and bust in Florida, sparking a slew of regional bank failures, the fallout of which "*soured bankers and homebuyers on the residential real estate market*" across the country (Eichengreen (2015)). During the Great Depression, banking panics and failures, falling incomes and rising unemployment, and the prevailing terms of mortgage contracts all contributed to a severe mortgage credit crunch and unprecedented foreclosure crisis. At the time, almost all mortgages were short-term loans of only up to 5-6 years, required large down payments, with loan-to-value ratios (LTVs) not exceeding 60%, and were structured as balloon mortgages as opposed to self-amortizing loans; borrowers would take out a new mortgage to repay the principal of their previous maturing mortgage, but this financing system imploded when panicked or failing banks stopped making new loans.

The first major federal intervention in residential mortgage markets was the creation of the Federal Home Loan Bank System (FHLBS) by the Hoover administration in 1932, which was intended to provide a liquidity backstop for mortgage lenders. The FHLBS was modeled after the Federal Reserve System, organized as a governing Federal Home Loan Bank Board (FHLBB), twelve regional Federal Home Loan Banks (FHLBanks), and private mortgage lenders as members. The FHLBanks were chartered to facilitate and stabilize mortgage lending by providing liquidity via wholesale loans to member institutions, secured by members' mortgages. Membership was mandatory for federally chartered savings and loan associations (S&Ls) and voluntary for other institutions making long-term home mortgage loans.

The scope of housing credit policy interventions expanded considerably under the Roosevelt administration's New Deal legislation. In response to the

foreclosure crisis, Congress established and capitalized the Home Owners' Loan Corporation (HOLC) in 1933 to purchase mortgages in default from lenders and refinance delinquent mortgages on enticing terms. One year later, the watershed National Housing Act of 1934 created the Federal Housing Administration (FHA) to stimulate the construction sector and improve housing standards. Qualifying borrowers could obtain an attractive FHA-insured loan from a private mortgagee, while lenders could file mortgage insurance claims with the FHA if a borrower defaulted, thereby transferring credit risk to the federal government. The Act also created the Federal Savings and Loan Insurance Corporation (FSLIC) to extend deposit insurance to the thrift industry and stabilize mortgage market funding. Through the statutory terms for HOLC and FHA-insured mortgages, Congress transformed the norm for mortgage contracts to closely resemble the long-term fixed-rate self-amortizing mortgages prevalent today.[1] In 1935, the Reconstruction Finance Corporation (RFC) incorporated and capitalized the RFC Mortgage Company, principally to serve as a secondary market supporting FHA-insured mortgages.

In 1938, the Federal National Mortgage Association was established and authorized to support a more liquid secondary market for FHA-insured mortgages. Congress had repeatedly tried, albeit unsuccessfully, to induce the incorporation of legally privileged private national mortgage associations, which had been authorized by the National Housing Act of 1934; after several years of private sector inaction, FNMA was chartered as a wholly owned subsidiary of the RFC, which also provided Fannie's initial capitalization.

[1] HOLC loans allowed higher LTVs of up to 80%, were self-amortizing over a longer 15 year maturity (later revised to 25 years), and bore fixed interest rates capped at 5%. Loan limits were set at $14,000, a relatively modest size at the time. FHA-insured loans initially imposed maximum LTVs of 80%, maturities of 20 years, interest rates of 5%, and loan limits of $16,000.

The Servicemen's Readjustment Act of 1944 (or 'GI Bill') established the Veterans Administration (VA) mortgage guarantee program, which allowed veterans to obtain mortgages with very low down payments.[2] The program was intended as a cheap alternative reward to cash bonuses for veterans, as well as to reinvigorate housing construction, which had cratered again during the war. The RFC Mortgage Company initially expanded secondary market operations to support VA mortgages. After the RFC Mortgage Company was dissolved in 1948, Fannie was rechartered and authorized to support a secondary market in VA mortgages later that year. The Korean GI Bill extended the VA home loan benefit to Korean War vets, setting precedent that eligibility would be extended following every major subsequent conflict or deployment.

The National Housing Act of 1954 rechartered a nearly bankrupted Fannie Mae, turning it into a mixed-ownership corporation by requiring that mortgagee counterparties purchase common stock, and authorized Fannie to issue debt, subject to leverage constraints.[3] The bill envisaged an eventual full privatization, but set no mechanism or timeline for such a transition; the Act also introduced a standby line of credit with the Department for Fannie's secondary market operations, intended as a liquidity backstop to reassure private lenders. The Housing and Urban Development Act of 1968 split FNMA into a quasi-private Fannie Mae and a government-owned Government National Mortgage Association—a move largely intended to remove Fannie Mae's balance sheet and debt issues from the federal budget ledger. The new shareholder-owned Fannie Mae assumed secondary market operations, but retained the ability to

[2]Subject to eligibility requirements, veterans enjoyed a limited guarantee on loans used for the purchase or construction of residential property, or home repairs and improvement; the VA would pay the private lender a portion of losses in the event that a veteran defaulted on a guaranteed loan.

[3]Preferred stock ownership remained with the federal government.

borrow from the Treasury, widely perceived as an implicit government guarantee. Ginnie Mae assumed the other functions, which largely entailed cyclically motivated interventions or purchases supporting difficult-to-market FHA/VA mortgages. The Department of Housing and Urban Development (HUD), established as a Cabinet-level agency in 1965, fully administered Ginnie and retained considerable regulatory authority over Fannie. Ginnie was actively used to intervene in mortgage markets until its purchase programs were wound down in the early 1980s.

The 1970s ushered in the ascendence of government-sponsored secondary mortgage markets. Following the 1969 credit crunch, the Emergency Home Finance Act of 1970 authorized Fannie to expand its activities from dealing solely in FHA/VA mortgages to the much larger conventional mortgage market.[4] That Act also chartered the Federal Home Loan Mortgage Corporation as a companion government-sponsored enterprise (GSE) to support a secondary market for conventional mortgages for the S&Ls.[5] Like Fannie, Freddie was chartered with preferential tax and regulatory treatment, but ownership and regulation of Freddie was placed with the FHLBS. Freddie was authorized to issue debt securities and sell mortgage-backed securities (MBS) issued against pools of mortgages. In February 1970, GNMA issued the first publicly traded pass-through securities, backed with interests in pools of FHA/VA mortgages, with timely payment explicitly backed by a government guarantee. In 1971, Freddie started a program of pass-through securities, or 'participation certificates,' backed by conventional mortgages, with default risk guaranteed by Freddie.

[4]Conventional mortgages are loans that are not directly guaranteed by the federal government.

[5]The FHLBS is also a housing GSE, while the government-retained Ginnie Mae is not a GSE. With an abuse of notation, we use the term 'GSEs' or 'Enterprises' to refer simply to Fannie and Freddie, the only housing GSEs of focus in this paper.

Freddie's MBS were largely sold to third parties, so its retained portfolio—primarily used for MBS pooling inventory—remained small relative to that of Fannie through the 1980s. Fannie's greater retained portfolio and interest rate risk exposure led to large losses in the early 1980s. The Reagan administration's plans to fully privatize both GSEs were delayed while Fannie's balance sheet was recovering, aided by accommodating tax and regulatory policies. A deregulatory regime tried to help both the thrift industry and Fannie grow their way back to health without taxpayer bailouts or recapitalizations, exacerbating the subsequent S&L crisis, which again delayed any attempt at privatization.

Amidst the S&L crisis and public resolution of failed thrifts, the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 expanded the GSEs' secondary mortgage market objectives to include promoting housing for low- and moderate-income borrowers. The Act also converted Freddie into a publicly traded shareholder-owned corporation, transferring regulatory authority to HUD. Freddie was also extended the same $2.25 billion standby credit line with the Treasury as afforded Fannie, bolstering the perception of an implicit government guarantee of agency debt securities. Congress also diverted FHLBank earnings to affordable housing goals and repaying thrift resolutions; this action had the unintended consequence of pressuring the FHLBS to increase earnings, prompting a leveraged balance sheet expansion into MBS. The Federal Housing Enterprises Financial Safety and Soundness Act of 1992 established minimal capital requirements for the GSEs and mandated that HUD set affordable housing goals.

The 1990s and early 2000s saw considerable balance sheet growth of Fannie and Freddie largely unrelated to deliberate federal policy changes. After

publicly listing, earnings pressure drove Freddie to exploit the profitability of balance sheet expansion, and its retained portfolio began catching up with Fannie (Greenspan (2005)). The GSEs' automated underwriting systems became widely used by originators, guaranteeing that their mortgages could easily be sold to secondary markets, helping the GSEs gain market share. An era of low interest rates triggered a massive mortgage refinancing wave, which Fannie and Freddie capitalized on. And Fannie and Freddie successfully courted and expanded debt issuance to foreign institutional investors, aided by a falling supply of Treasuries. New FHLBank programs were also authorized for portfolio purchases of whole loans from members, creating an alternative secondary market for their members.

Accounting scandals that surfaced in the early 2000s, however, prompted greater regulatory oversight of the GSEs, capital surcharges, and portfolio caps, contributing to declining agency shares of mortgage holdings and guaranteed mortgage debt in the mid-2000s. The GSEs' purchase and securitization activity also slowed with the end of the refinancing boom in 2003. The explosion of subprime and alt-A mortgage lending and private-label MBS issuance was also an important factor behind the agencies' falling market shares.

Government agencies rapidly regained and then surpassed their previous market share highs as the housing market and private mortgage lending collapsed ahead of and during the Great Recession. Fannie and Freddie were heavy-handedly reminded of their public missions and pushed to expand purchases in a tanking market; their portfolio limits were relaxed in September 2007 and again in February 2009, while capital surcharges were removed in March 2008. The Economic Stimulus Act of 2008 vastly increased conform-

ing loan limits to expand the reach of GSE purchases and securitization.[6] The FHLBanks also effectively served as an alternative discount window (on more favorable terms than the Fed), and saw lending activity and mortgage holdings rise sharply.

The Housing and Economic Recovery Act of 2008 authorized the Treasury Department to purchase securities issued by Fannie and Freddie and dissolved several regulatory agencies, consolidating authority into the newly created Federal Housing Finance Agency (FHFA). In September 2008, Fannie and Freddie were placed under the conservatorship of the FHFA and Treasury, and were ordered to first increase, then gradually reduce their mortgage portfolios. The Treasury concurrently announced an agency MBS purchase program that resulted in nearly $200 billion worth of purchases through the end of 2009. The Federal Reserve launched its first round of quantitative easing (QE) asset purchases in November 2008, initially committing to purchase $500 billion in agency MBS and $100 billion in agency debt.[7] The March 2009 expansion of QE1 committed to purchasing an additional $750 billion in agency MBS and another $100 billion in agency debt. Operation Twist, announced in September 2011, shifted reinvestment of principal repayments from agency MBS and agency debt holdings back into agency MBS, instead of Treasuries. When launched in September 2012, QE3 committed to purchasing $40 billion in agency MBS a month, tapered to $35 billion in December 2013, and terminated in October 2014. For a period during these active mortgage market interventions, agency net portfolio purchases and pool issues effectively accounted for all US mort-

[6]Conforming loans are mortgages that meet the GSEs' guidelines for eligible purchases, notably a loan limit and LTV limit.

[7]The Interest Rate Adjustment Act of 1966 temporarily amended the Federal Reserve Act to make any security of any government agency eligible for the conduct of open market operations, authority made permanent in 1968 (Haltom and Sharp (2014)).

Table 3.2: Glossary of Acronyms Used

AHPs	affordable housing programs
ARMs	adjustable-rate mortgages
ARRA	American Recovery and Reinvestment Act of 2009
CBO	Congressional Budget Office
CMOs	collateralized mortgage obligations
CRS	Congressional Research Service
ESA	Economic Stimulus Act of 2008
FDIC	Federal Deposit Insurance Corporation
FHA	Federal Housing Administration
FHEFSSA	Federal Housing Enterprises Financial Safety and Soundness Act of 1992
FHFA	Federal Housing Finance Agency
FHFB	Federal Housing Finance Board
FHLBanks	Federal Home Loan Banks
FHLBB	Federal Home Loan Bank Board
FHLBS	Federal Home Loan Bank System
FHLMC	Federal Home Loan Mortgage Corporation
FIRREA	Financial Institutions Reform, Recovery, and Enforcement Act of 1989
FNMA	Federal National Mortgage Association
FOMC	Federal Open Market Committee
FSLIC	Federal Savings and Loan Insurance Corporation
FY	fiscal year
GAAP	generally accepted accounting principles
GAO	Government Accountability Office
GNMA	Government National Mortgage Association
GPMs	graduated payment mortgages
GSE	government-sponsored enterprise
HERA	Housing and Economic Recovery Act of 2008
HARP	Home Affordable Refinance Program
HMDA	Home Mortgage Disclosure Act of 1975
HOLC	Home Owners' Loan Corporation
HUD	Department of Housing and Urban Development
HUDA	Housing and Urban Development Act of 1968
JCT	Joint Committee on Taxation
LTV	loan-to-value ratio
MBS	mortgage-backed securities
NCUA	National Credit Union Administration
NHA	National Housing Act of 1934
NYSE	New York Stock Exchange
OCC	Office of the Comptroller of the Currency
OFHEO	Office of Federal Housing Enterprise Oversight
OMB	Office of Management and Budget
PCs	Mortgage Participation Certificates
QE	quantitative easing
REMICs	real estate mortgage investment conduit
RFC	Reconstruction Finance Corporation
RRMs	renegotiable-rate mortgages
RTC	Resolution Trust Corporation
S&Ls	savings and loan associations
SEC	Securities and Exchange Commission
SPSPA	Senior Preferred Stock Purchase Agreement
TARP	Troubled Asset Relief Program
UPB	unpaid principal balance
VA	Veterans Administration/Department of Veterans Affairs

gage originations. As of this writing, the Fed's balance sheet held $1.77 trillion worth of securitized US residential mortgage debt, more than 15% of that outstanding.[8] Fannie's and Freddie's portfolios continue to be shrunk while they remain in government conservatorship, but their eventual fate remains unclear.

3.3 Overview of Methodology

The principal purpose of this narrative analysis of federal housing credit policy changes is developing a record of events that can be used as a valid instrumental variable for agency purchases of mortgage assets. The narrative development of policy instruments follows five steps. We start by restricting the sample and focus of housing credit interventions for consistent use as news shocks. We then identify binding, significant policy changes expected to affect agency's purchases and retained portfolio activity. We quantify these significant policies' ex ante projected impact on agency mortgage holdings. We also pinpoint our best determination of when news of each policy change was made public. Lastly, we classify each significant policy as either 'cyclically motivated' or 'non-cyclically motivated.' Here we provide an overview of the procedures and data sources used in each of these steps. The companion paper, Fieldhouse, Mertens, and Ravn (2017), also provides a similar but substantially abbreviated overview of this methodology.

[8]The Fed's balance sheet included $1.77 trillion worth of FNMA, FHLMC, and GNMA MBS as of June 28, 2017, or 15.3% of the $11.54 trillion in total mortgage debt outstanding for one- to four-family residences and multifamily residences as of 2017Q1, the most recently available quarter (Federal Reserve Statistical Release H.4.1 and Mortgage Debt Outstanding (1.54).

3.3.1 Sample Restriction

The starting point for the narrative analysis is the landmark Housing and Urban Development Act of 1968, a choice made to select a period of relative institutional stability. That Act split off FNMA's secondary mortgage market operations into a quasi-privatized shareholder-owned Fannie Mae, while creating a HUD-retained Ginnie Mae to assume FNMA's remaining operations. This choice also roughly coincides with the creation of Freddie Mac in 1970, Fannie Mae's authorization to enter the conventional market in 1970, the emergence of a nationwide secondary market for both FHA/VA and conventional mortgages, the beginning of mortgage securitization and its rapid growth, and the ascendancy of the quasi-privatized GSE era. We largely focus on the mortgage portfolio activity of Fannie, Freddie, and Ginnie, ignoring less significant government entities for which monthly portfolio data is not easily available.[9] Fannie has historically accounted for the largest share of post-war mortgage holdings, although Freddie grew rapidly and began catching up after being privatized in 1989. Ginnie also accounted for a significant share of mortgage holdings before its purchase programs were wound down in the early 1980s.[10] As shown in Figure 3.1, these three housing agencies of focus have accounted for the vast majority of government agency mortgage holdings prior to the financial crisis. We also include as significant policy changes the agency MBS purchase programs of the Federal Reserve and Treasury Department during the Great Recession,

[9]The FHLBS has also played a large role in US federal housing credit policy, albeit principally by providing wholesale liquidity to member mortgage lenders. The FHLBS did start purchasing and holding MBS in the early 1990s and several FHLBanks created quasi-secondary markets for whole loans starting in the late 1990s, but we ignore these purchases due to data limitations for purchases and holdings at a monthly frequency.

[10]Guaranteeing timely payment of MBS has comprised of nearly all of Ginnie's subsequent activity in mortgage markets, but unlike the housing GSEs, Ginnie does not directly hold a pooling inventory or retain MBS on portfolio.

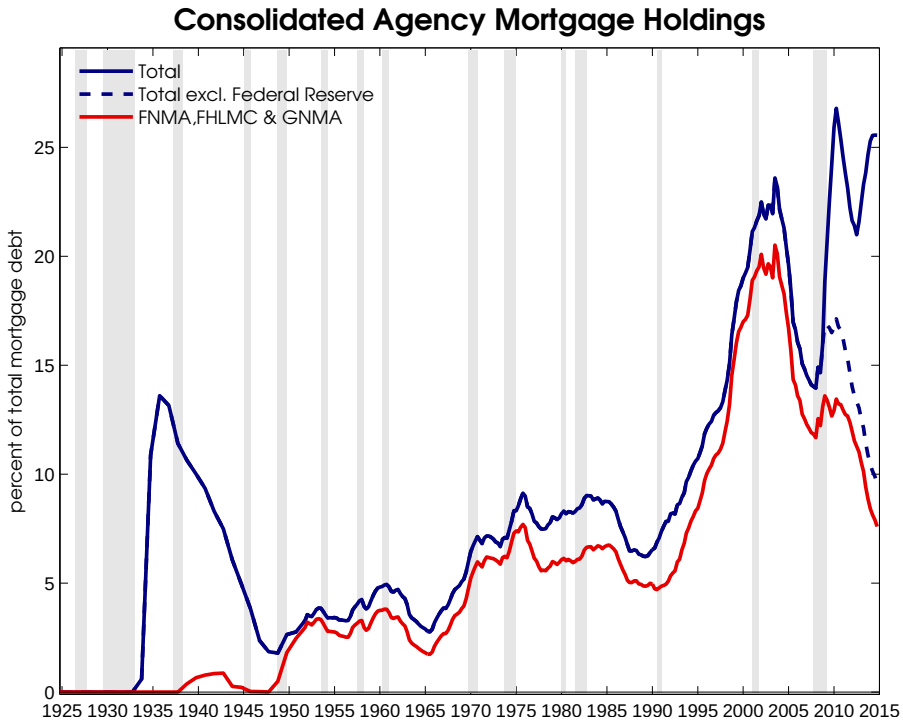

Figure 3.1. Agency Market Share of Mortgage Debt Outstanding

Notes: Residential mortgage debt and originations include home as well as multifamily mortgages. Agency holdings include holdings of both whole loans and pools. The grey bars are NBER-dated recessions. Sources: see data appendix of Fieldhouse, Mertens, and Ravn (2017).

although all of these policies were clearly cyclically motivated.

3.3.2 Identifying Significant Policy Changes

We restrict our attention to 'significant' policy events that would either be expected to impact agencies' permissible volume of net purchases and retained portfolio holdings or considerably expand the pool of eligible mortgages an agency was authorized or required to purchase. Policies influencing retained portfolio volumes include leverage ratios, portfolio caps, and direct appropriations or provision of working capital, whereas policies considerably expanding

the pool of eligible mortgages include changes to conforming loan limits, affordable housing goals, or classes of mortgages eligible for purchase, such as conventional, adjustable-rate, or second mortgages.

We use a wide range of sources for identifying legislative and regulatory changes affecting agency purchases, using primary sources, whenever possible, both in searching for and analyzing policy changes. We also cross-reference identified policy changes with multiple sources whenever possible. As a reference, Table 3.3 lists all primary sources used in compiling the narrative analysis.

Policy changes affecting agency mortgage purchases have been directed by a range of policymakers, notably Congress, the President, Treasury Secretary, and HUD Secretary, various regulatory agencies in the executive branch, and the Federal Open Market Committee (FOMC). The relevant regulatory institutions setting policy have varied over the decades, particularly as regulatory bodies were disbanded and reinvented in the aftermath of various crises or perceived regulatory failures, further necessitating the use of a wide range of sources. Principal sources used in identifying and analyzing significant policy changes include the legislative text of public laws, the Federal Register, the *Budget of the United States Government*, the *Economic Report of the President*, and periodical reports of the agencies and their regulators, notably the annual reports of the Enterprises, HUD, FHFA, and Office of Federal Housing Enterprise Oversight (OFHEO).

Significant policy changes affecting government agencies' mortgage holdings generally originate from enacted legislative changes, regulatory policy changes published in the Federal Register or as other binding agreements, or macroeconomic stabilization policies managed by the Federal Reserve or Trea-

sury. Significant policy changes determined legislatively include adjustments to statutory leverage ratios, capital requirements, and conforming loan limits, provisions of working capital, mandatory retirements of public stock, direct appropriations or borrowing authority for purchases, and authorizations for agencies to enter new segments of the mortgage market, among others. Significant regulatory policy changes include setting permissible debt-to-capital ratios, imposing capital surcharges in excess of statutory capital requirements, capping portfolio size or growth, setting affordable housing goals, and authorizing agencies to enter new segments of the mortgage market. Macroeconomic stabilization actions include the Treasury Department and FHFA taking Fannie and Freddie into conservatorship in September 2008, subsequent amendments to the conservatorship agreements, and large-scale asset purchases of agency MBS conducted by the Federal Reserve and Treasury since 2008.

We use the comprehensive Congressional Research Service (CRS) report *A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003* (CRS (2004)) as a starting point for identifying significant policy changes, particularly pertinent public laws. This legislative history is cross-referenced with the *Congressional Quarterly Almanac*'s Housing and Development and/or Appropriations trackers. Appendices of the *Budget of the United States Government* are additionally searched for information about policy changes affecting Ginnie Mae during relevant years, cross-referenced with HUD appropriations bills and related reports of the House and Senate Appropriations Committees. After identifying public laws affecting Fannie, Freddie, and Ginnie, we use the ProQuest Congressional Publications Database's Legislative & Executive Publications to collect the legislative text of those enacted laws, related committee reports, related Congressional hearing transcripts, and the preceding House and Senate

versions of the final bill, if applicable. We then analyze relevant sections of these primary sources to confirm these laws' material impact on mortgage holdings and better understand the nature and timing of the policy changes at hand. Transcripts of all public laws, committee reports, and hearings were contemporaneously made publicly available, and are easily accessible online for recent decades.[11]

Legislative actions are often also the impetus for drafting new regulatory rules, and identified significant legislative events are the starting point for a directed search of related, significant regulatory changes using HeinOnline's Federal Register Library. We obtain information from the *Annual Report of the Federal National Mortgage Association* and *Annual Report of the Federal Home Loan Mortgage Corporation* about significant regulatory changes for the GSEs, and from their 10-K filings for events after 2003, when Fannie and Freddie 'voluntarily' registered with the Securities and Exchange Commission (SEC) and began filing audited financial reports. Sections of the *Economic Report of the President* and *Annual Report of the Board of Governors of the Federal Reserve* related to housing are also scanned for information about regulatory changes, as are various reports of regulators. After identifying regulatory policy events, we use newspapers, financial newswires, and mortgage industry newsletters to help direct the search for information about the rulings and their publication in the Federal Register, particularly the *Wall Street Journal*, *American Banker*, and *National Mortgage*

[11]The ProQuest Congressional Publications Database's Legislative & Executive Publications provides a comprehensive compilation of all such documents (http://congressional.proquest.com/congressional, subscription required). Public laws and related legislative actions since 1973 are available from Congress.gov, a project of the Library of Congress, along with committee reports since 1995. Most older public laws are available through LegisWorks Statutes at Large Project (http://legisworks.org/sal/), created and maintained by Joe Carmel. Most hearing transcripts are digitally available since 1985 from the US Government Publishing Office (https://www.gpo.gov/fdsys/browse/collection.action?collectionCode=CHRG).

News. This is principally accomplished by Factiva, LexisNexis Academic, and ProQuest Historical Newspapers searches of key words related to the regulatory policy change, in search windows around the vicinity of the event. After roughly pinpointing the publication date of a rule, we search HeinOnline's Federal Register Library for the rule itself, and then work backwards to initial rulings, if applicable. Final rules published in the Federal Register almost always include a detailed background and overview of the initial proposed rule, public comments received, and any subsequent modification of the rule.

All significant policy changes identified and documented below in this narrative analysis begin with a table summarizing the regulatory policy change, the affected agency, the policy's projected annualized impact on that agency's retained purchases (in nominal billions), our determination of its news being made public, the timing of the policy becoming effective, and our classification of the policy as motivated by either cyclical or non-cyclical concerns. These policy specific tables are then compiled chronologically in Table 3.4.

Table 3.3: Sources for Narrative Analysis

Government Publications	
Board of Governors	Annual Report, Press releases, *Federal Reserve Bulletin*
Congressional Budget Office	*The Housing Finance System and Federal Policy: Recent Changes and Options for the Future* (1983), *Controlling Risks of Government-Sponsored Enterprises* (1991)
Congressional Quarterly	*Congressional Quarterly Almanac*
Congressional Research Service	*A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003* (2004), *The Conforming Loan Limit* (2008)
Council of Economic Advisors	*Economic Report of the President*
Department of Housing and Urban Development	HUD news releases, *The Secondary Market in Residential Mortgages* (1983), *1986 Report to Congress on the Federal National Mortgage Association* (1987), *The National Homeownership Strategy: Partners in the American Dream* (1995), *Privatization of Fannie Mae and Freddie Mac: Desirability and Feasibility* (1996), *Profiles of GSE Mortgage Purchases in 2001-2004* (2008)
Department of the Treasury	Press releases and statements, *Report of the Secretary of the Treasury on Government-Sponsored Enterprises* (1990), *Government Sponsorship of the FNMA and the FHLMC* (1996)
Federal Home Loan Mortgage Corporation	Press releases and statements, Annual Report, Form 10-K
Federal Housing Finance Administration	Press releases and statements, *Mortgage Market Notes*
Federal National Mortgage Association	Press releases and statements, Annual Report, Form 10-K, *Monthly Volume Summary*, *Information Statement*, *MBSenger*, *Offering Circular*, *Background and History of the Federal National Mortgage Association* (1969, 1973)
Financial Crisis Inquiry Commission	*Final Report of the Financial Crisis Inquiry Commission* (2011)
Government Accountability Office	*The Federal National Mortgage Association in a Changing Environment* (1985), *GSEs: A Framework for Limiting the Government's Exposure to Risk* (1991), *Housing Enterprises: Potential Impacts of Severing Government Sponsorship* (1996), *HUD's Mission Oversight Needs to be Strengthened* (1998)
US Congress	Hearing transcripts and reports: Committees on Appropriations, Committees on Banking and Currency, Committee on Banking, Finance and Urban Affairs, and Committee on Banking, Housing and Urban Affairs
Office of Federal Housing Enterprise Oversight	Press releases and statements, Annual Report, *Mortgage Market Notes*, *Mortgage Markets and the Enterprises*, *Evaluating the Capital Adequacy of Freddie Mac and Fannie Mae* (1998), *Special Examination Reports* (2003, 2004, 2006)
Office of the Federal Register	*Federal Register*
Office of Management and Budget	*Budget of the United States Government*
The President's Commission on Housing	*The Report of The President's Commission on Housing* (1982)
Press and Online Sources	

	ABA Banking Journal, *American Banker*, *The American Presidency Project*, *The Bond Buyer*, *Dow Jones Capital Market Reports*, *Dow Jones News Service*, *Dow Jones Newswires*, *Financial Times*, *MarketWatch*, *National Mortgage News*, *The New York Times*, *Reuters News*, *The Wall Street Journal*, *The Washington Post*
Overview Books and Articles	
Bartke	*Fannie Mae and the Secondary Mortgage Market* (1971), *Home Financing at a Crossroads: A Study of the Federal Home Loan Mortgage Corporation* (1973)
Elliot, Feldberg, and Lehnert	*The History of Cyclical Macroprudential Policy in the US* (2013)
Greenspan	*The Age of Turbulence: Adventures in a New World* (2007)
Haar	*Federal Credit and Private Housing: The Mass Financing Dilemma* (1960)
Hagerty	*The Fateful History of Fannie Mae: New Deal Birth to Mortgage Crisis Fall* (2012)
Hoffman and Cassell	*Mission Expansion in the Federal Home Loan Bank System* (2010)
Hunter	*The FNMA: Its Response to Critical Financing Requirements of Housing* (1971)
McLean	*Shaky Ground: The Strange Saga of the US Mortgage Giants* (2015)

Notes: For detailed bibliographical references, see Fieldhouse and Mertens (2017).

3.3.3 Quantification

Significant policy changes must be sufficiently material that primary sources either explicitly cite projections of their pending impact or can be used to quantify likely short-run impacts back-of-the-envelope. For each policy, we use information available in contemporaneous sources to obtain an ex ante estimate of the projected impact on the agencies' capacity to purchase mortgages, measured in annualized billions of nominal dollars. For relatively large, open-ended changes, such as leverage ratio increases or permanent funding authorizations, potential effects on mortgage holdings are annualized using a 'two-year rule,' which assumes that only half of the full potential impact would be realized

within the first year of taking effect. The two-year rule is meant to accommodate the likelihood that, driven by profit incentives and/or regulatory pressure, balance sheet policy changes would have an impact within a year without necessarily becoming a tightly binding constraint.

We use ex ante balance sheet data on regulatory capital, liabilities, and/or assets in conjunction with standing leverage or capitalization requirements to estimate the impact of related changes. If a baseline is needed for quantifying a policy change, say for regulatory capital when a permissible debt-to-capital ratio is increased, we use the most recent data publicly available prior to the policy change's news being made public. For example, the HUD Secretary increased Fannie's permissible debt-to-capital ratio from 25-to-1 to 30-to-1 in December 1982. We use regulatory capital from the end of calendar year 1981—the most recent publicly available baseline we could find prior to the announcement—of $2.5 billion (Department of the Treasury (1990), p. A-82), implying maximum growth in mortgage assets of $12.5 billion ($2.5 billion × (30 - 25) = $12.5 billion). Using the two-year rule, we assign a $6.25 billion annualized increase in Fannie's permissible purchase activity. All such back-of-the-envelope calculations are explicitly spelled out in Section 3.4 below.

Public capital injections are quantified as a multiple of one more than the prevailing leverage ratio, to capture the potential increase in assets supported by related debt issues plus the working capital itself. Direct appropriations are the most straightforward policies to quantify, at most requiring a pro-rata annualization adjustment based on relevant implementation lags.

To quantify potential impacts of discretionary conforming loan limit changes, we rely, whenever possible, on estimates from accompanying Con-

gressional committee reports, which typically cite projections of the extent to which a large conforming loan limit increase would restore a GSE's real purchase activity; we quantify the impact of such adjustments as the difference between annualized purchase volumes immediately preceding the policy change and the home price index-adjusted purchase volume of the benchmark year being restored. For example, the Housing and Community Development Act of 1974 raised the conforming loan limit for conventional mortgages eligible for purchase by Fannie and Freddie from $33,000 to $55,000. The accompanying House committee report stated that raising FNMA's loan limit to $55,0000 "*would permit FNMA to serve much the same housing market in terms of constant dollars as it was authorized to serve when the Emergency Home Finance Act was enacted [in July 1970]*" (House Committee on Banking and Currency (1974), p. 29). Pursuant to House and Senate committee report language, we assume that the change would restore FNMA's real purchasing power relative to purchase volumes around enactment of the Emergency Home Finance Act in July 1970 and the last FHA Section 203(b) loan limit increase in December 1969.[12] The $5.93 billion average net purchase volume over 1969Q4 through 1970Q3 would have translated to $7.91 billion at the end of June 1974, adjusted for the 33.3% increase in OFHEO's seasonally adjusted Constant-Quality House Price Index for new homes sold over 1970Q3 and 1974Q2. We use four-quarter rolling averages to smooth out any residual seasonality and other idiosyncratic sources of volatility. Relative to the $6.77 billion average net purchase volume over 1973Q3 and 1974Q2, the year before enactment of the Housing and Community Development Act of 1974, this represents an increase of $1.14 billion, which we assign as the projected impact of the policy change on Fannie's purchase capacity for

[12]The standing $33,000 limit was based on the Section 203(b) loan limit for FHA-insured mortgages.

the year starting August 1974.

For other policies that are inherently harder to quantify, such as authorizations for program expansions into new mortgage market segments, we search for ex ante estimates of projected impacts on purchasing activity from committee reports, market analysts, regulators, or agency executives. The impacts of such policies largely depend on the size of the relevant market segment being entered and, in many cases, how secondary market access might expand primary market issuance, rendering these policies much more difficult to quantify back-of-the-envelope. For instance, Fannie Mae announced that it would begin purchasing second mortgages beginning in late November 1981, shortly after the HUD Secretary temporarily approved FNMA to purchase second lien mortgages and revised HUD's regulatory definition 'mortgage loan' to enable such purchases (The American Banker (11/20/1981)). While trying to secure approval, Fannie had recently estimated it could finance up to $5 billion worth of second mortgage loans a year, or roughly one-quarter of originations (The Washington Post (8/8/1981)), an estimate we use as the basis of our quantification.

In trying to capture regulatory shocks to agency purchases, we do not consider as significant any laws or regulations that merely extend prior authorizations or rules. For example, when Fannie was authorized to purchase second mortgages and create a secondary market for subordinate liens in September 1981, this authority was set to expire in March 1983. In practice, this authorization was renewed several times before being made permanent in 1987. We only count the first temporary authorization as a significant policy change. Similarly, we use a current policy baseline as opposed to a current law baseline for

scoring annual funding changes, if applicable, for certain authorizations, particularly those affecting Ginnie. For example, after the GSEs' conforming loan limit was indexed to annual growth in a home price index in 1980, we do not consider any related changes from indexation to be significant, as such adjustments were both a continuation of current policy and easily anticipated based on public information about the growth of home prices.

We do not treat as significant policies that would not have been expected to impose or alleviate binding constraints on agency retained portfolio activity. More specifically, when adjustments to leverage ratios or affordable housing goals are viewed as non-binding by most accounts and this appears consistent with the agencies' balance sheet and purchase behavior, we do not consider the policy change significant. For instance, the statutory capital requirements imposed on both Fannie and Freddie in 1992 had no expected impact on the balance sheet behavior of Freddie Mac, which had a much stronger capital position than Fannie and did not appear to be the focus of regulators' concerns; indeed no effort to increase capitalization could be discerned for Freddie ex post, while the opposite was true for Fannie. Authorization extensions or other policies that may have had only an incidental impact on purchases are, however, often documented to shed light on the motivation of related significant policy changes and to present a more comprehensive narrative of the pertinent evolution of US federal housing credit policy. Similarly, we take note of regulatory changes for which we could not obtain credible estimates of the impact on holdings, but exclude these from our instrument.

When estimating the quantitative aspects of policies, we rely on information released by the Congressional Budget Office (CBO), Government Accountabil-

ity Office (GAO), Treasury Department, and CRS that contain detailed analyses of policy changes, background information, and/or balance sheet data for the agencies in question.[13] We also use information from the annual or periodic reports of the government agencies and regulators, particularly regarding balance sheet data. We use information from appropriations bills and budget appendices for certain policies affecting Ginnie Mae. For legislative housing policy authorizations, the accompanying reports of the US Senate Committee on Banking, Housing, and Urban Affairs and the US House Financial Services Committee (or their preceding committees of jurisdiction) typically include CBO cost estimates and/or staff estimates of a bill's impact, if applicable.[14] Newspapers, financial newswires, and mortgage industry newsletters are also used to search for projections of policies that are difficult to quantify.

3.3.4 Timing

At the operational level, housing agencies generally sell commitments to purchase mortgages from primary market lenders at a predetermined price, which may then be exercised by the mortgagee up to an expiration date, often up to one year. Consequently, actual agency purchases lag somewhat behind the issuance of commitments to purchase mortgages from primary market mortgagees. The quantified policy events are thus best thought of as news shocks about pending agency purchases and balance sheet expansions or contractions. As such, we date each policy intervention to the month in which we determine that it

[13]The Government Accounting Office was renamed the Government Accountability Office in 2004.

[14]The House Committee on Banking and Currency and then the House Committee on Banking, Finance, and Urban Affairs preceded the House Financial Services Committee. The Senate Committee on Banking and Currency preceded the Senate Committee on Banking, Housing, and Urban Affairs.

became publicly anticipated, rather than the month in which it was formally announced or took effect.

Disagreements over provisions in House and Senate versions of a bill, wholesale amendments in the conference process, and uncertainty about bills stalling out entirely makes it harder to characterize expectations about pending legislative policy changes than regulatory changes.[15] A policy proposal arising from a single chamber does not seem likely enough to be enacted to be actionable news, and relevant housing credit policy provisions are often materially changed in conference committee. As such, legislative changes are dated to the provision containing the policy change of interest being agreed upon by both the House and Senate—often a conference committee's negotiation of a compromise bill—rather than upon first proposal by one chamber or the bill's subsequent enactment. Enactment usually follows within a week or so of both chambers agreeing to a conference report, if necessary.

For regulatory changes, we typically use the month in which final rules were first reported in the press or published in the Federal Register, as opposed to the date of the final rule's effect. But regulations are often backdated to a proposed rule first being published in Federal Register, if materially similar to the final rule. When new legislation serves as the impetus for a discretionary regulatory change, say by the HUD Secretary, as opposed to directly changing policy itself, we date the timing of the policy change to the first announcement of the pertinent regulatory change. If applicable, policies are dated when leaked to the press ahead of formal announcement, or when agencies are found to be demon-

[15] If the House and Senate are in disagreement about legislation, one chamber can reject the other chamber's amended legislation and request forming a conference committee to negotiate a bill acceptable to both chambers. Conference committees are usually comprised of senior committee members from the bill's committees of jurisdiction.

strably getting ahead of the curve of pending policy changes they view as both anticipated and actionable.

For Fannie and Freddie, we also cross-reference announcements about policy events with excess stock returns, measured relative to daily changes in the S&P 500, when available, as well as financial newspapers and newswires to help verify the timing of policy changes, specifically whether news about the policy was being priced in to shares. The underlying idea is that portfolio purchases, for a variety of reasons including implicit government guarantees as well as tax and regulatory advantages, are profitable for Fannie and Freddie, and thus loosening regulatory balance sheet restrictions should influence their stock returns relative to the market at large (see Fieldhouse, Mertens, and Ravn (2017)).

The ProQuest Congressional Publications Database, HeinOnline's Federal Register Library, *CQ Almanac*, and newspapers and newsletters are the primary sources used for documenting pertinent news surrounding policy changes, as well as subsequent implementation dates. Factiva, LexisNexis Academic, ProQuest Historical Newspapers, and Gale Business Insights: Essentials are the principal sources used in searching for pertinent information from newspapers and newswires, particularly from *The Wall Street Journal*, *The New York Times*, *The Washington Post*, *Financial Times*, *American Banker*, *National Mortgage News*, *Dow Jones Newswires*, and *The Bond Buyer*. These sources are also often used for classifying policy's underlying motivations, discussed below.

3.3.5 Classification by Motivation

The aim behind classifying the policy changes is to distinguish between regulatory actions that were prompted by concerns about the prevailing business cycle, credit cycle, or the housing and mortgage markets in particular, versus those motivated by unrelated concerns. As an instrumental variable for agency purchase activity, the intent is to restrict usage to policy events deemed orthogonal to cyclical concerns, omitting those displaying some degree of endogenous, economically driven policy response. There is a systematic, counter-cyclical response of US federal housing credit policy to economic downturns and credit crunches, as extensively documented in Section 3.4, so such an exclusion is important for addressing reverse causality between credit aggregates and agency purchases. Our classification is primarily based on identifying stated or perceived motivations underlying each policy intervention, but as discussed below, the related political process and economic circumstances are often also quite informative. In classifying policies' overarching motivations, we parse historical documents, paying particular attention to the rationales invoked by policymakers and the press, the nature of the legislative vehicles or regulatory processes, the relation to known periods of economic and financial stress, and the time horizon of policy objectives.

The principal data sources used in identifying policy motives include Congressional committee reports and hearings, Presidential speeches, the *Budget of the United States Government*, *Economic Report of the President*, *Federal Reserve Bulletin*, *Annual Report of the Board of Governors of the Federal Reserve*, *CQ Almanac*, and newspapers, financial newswires, and mortgage industry newsletters. For legislative housing policy authorizations, the accompanying reports

of the US Senate Committee on Banking, Housing, and Urban Affairs and US House Financial Services Committee (or their preceding committees of jurisdiction) typically detail the committees' motivations and any pertinent economic context. These reports also often include additional views or dissenting opinions by Committee members, providing a range of perspectives. Major housing policy laws are also usually accompanied by a Presidential signing statement explaining the bill's motivation, context, and intended impact.[16] State of the Union addresses and other Presidential speeches, the *Budget of the United States Government*, and the *Economic Report of the President* often shed insight on the motivation behind housing policies newly proposed by the White House. Budget appendices and/or committee reports accompanying appropriations bills usually explain the impetus for certain policy changes affecting Ginnie Mae. Final rules published in the Federal Register almost always include a detailed background and history of the rule, shedding light on regulators' motives for policy changes.

Policies classified as principally cyclically motivated tend to emphasize short-term outcomes, such as boosting housing starts in a recession. Legislative vehicles for such policy changes also tend to be quickly drafted and enacted, with a relatively concise legislative history and narrow focus. Policymakers are typically quite explicit about cyclical concerns and objectives, overwhelmingly so when policies are implemented in close proximity to recessions or credit crunches. Policies enacted during or near a recession or credit crunch are extensively scrutinized and held to a particularly high bar for being classified as unrelated to the business cycle, but are not categorically classified as

[16]Presidential speeches and signing statements are publicly available online from The American Presidency Project (www.presidency.ucsb.edu), a collaboration of John T. Woolley and Gerhard Peters.

cyclically motivated, and on the rare occasion are instead classified as non-cyclically motivated. When analyzing committee reports, signing statements, and the like, examples of language we tend to interpret as strongly indicative of cyclical concerns include, but are in no way limited to, "*emergency, crisis, recession, credit shortage, credit crunch, housing starts, employment, construction, downturn, depressed, stimulus, boost*," although such terms must be evaluated within the context of surrounding phrases. When inferring motives from policymakers' quotes or other primary sources in Section 3.4, such particularly informative language is typically emphasized in boldface, within broader quotations, for transparency about our interpretation and relevant context.

Conversely, policies principally motivated by social policy, budgetary, or other more ideological political objectives are classified as unrelated to the business or financial cycle—provided the narrative record is not also suggestive of significant short-term economic or financial concerns. Political rather than economic context shapes the development of these non-cyclically motivated policy changes, such as an administration's emphasis on expanding affordable homeownership opportunities to lower-income households, concerns regarding the structural budget deficit, or ideological hostility toward the GSEs motivating moves toward full privatization. Legislative policies classified as non-cyclically motivated emphasize longer-term outcomes, such as boosting homeownership rates. Legislative vehicles for such policy changes tend to be slower-moving bills, particularly deliberate overhauls of housing policy with a lengthy legislative history; the National Housing Acts, Housing and Urban Development Acts, and Housing and Community Development Acts of various years tend to meet this description, being slowly crafted and negotiated between the House, Senate, and White House, and focusing on broad, long-term objectives for housing

policy, such as urban revitalization or access to affordable housing for various constituencies. The drafting of new regulatory rules set in motion by such bills also tend to be classified as unrelated to cyclical concerns, such as HUD setting new affordable housing goals for the GSEs. More broadly, interventions classified as non-cyclically motivated tend to be actions shaped by prior law or prompted by events fundamentally unrelated to the business or credit cycle, such as the accounting scandals that surfaced at Freddie and then Fannie in 2003–2004. Examples of language we generally take as indicative of such non-cyclical motives include "*long-term, farsighted, comprehensive, low-income, affordable housing, American Dream, homeownership, budget deficit, reduce borrowing, off-budget, privatize*," again with the caveat regarding the importance of context.

Based on our reading of the historical record, we simply classify all significant policy changes as either cyclically motivated or non-cyclically motivated, as this binary classification is relatively straightforward and a more precise distinction between non-cyclical objectives is not particularly relevant. The non-cyclical classification spans policy changes with social policy concerns, structural budgetary motives, and more ideological political pursuits; it is often harder to establish a single precise rationale for these non-cyclical actions, in part because these policy changes unrelated to the business cycle tend to be enacted in deliberate and comprehensive bills frequently characterized by much deliberation and compromise between the House and Senate or Congress and the White House, often to the effect of promoting multiple non-cyclical objectives. For instance, the quasi-privatization of Fannie by the Housing and Urban Development Act of 1968 was largely motivated by structural budget concerns of the Johnson administration. But while the particular timing of Fannie's privatization was driven by budgetary concerns, privatization also fulfilled long-

standing Congressional intent dating back to Fannie's 1954 Charter Act. More broadly, the Act's stated purpose was "*[t]o assist in the provision of housing for low and moderate income families, and to extend and amend laws relating to housing and urban development*," and the expansive bill did much to advance an array of social policy objectives and redistributional concerns. Similarly, beyond promoting access to affordable housing for minorities and lower-income families, it has been suggested that the Bush administration pushed HUD to increase the Enterprises' affordable housing goals in 2004 in part "*to make sure Fannie and Freddie understood who was the boss in the relationship*" as part of a broader effort to rein in the GSEs being coordinated with the Federal Reserve (McLean (2015), p. 88).

3.3.6 Examples of Methodological Application and Classification

For a better sense of our application of the methodology overviewed above, particularly with respect to classification, below we provide concise examples of classifying one policy of each of the four broad categories of motivations outlined above.

Example 1: Business or Financial Cycle Motives. Policies motivated by economic or financial cycle concerns include those aimed at boosting housing starts or construction employment, and smoothing mortgage credit or lowering borrowing costs for would be homeowners. A clear example of a policy change motivated by both cyclical economic and financial concerns was a congressional authorization for up to $7.5 billion in "*emergency special assistance authority*" fund-

ing for Ginnie Mae to make subsidized purchases of conventional mortgages, one prong of the Emergency Home Purchase Assistance Act of 1974 (Pub. L. 93-449). The Act authorized the HUD Secretary to instruct GNMA to make emergency mortgage commitments and purchases "*whenever the Secretary finds* ***inflationary conditions and related governmental actions*** *are having a severely disproportionate effect on the housing industry and the resulting* ***reduction in the volume of home construction or acquisition threatens seriously to affect the economy*** *and to delay the orderly achievement of the national housing goals...*" (Sec. 3(a)). The bill was drafted and passed in a remarkably short time frame during the recession lasting from November 1973 through March 1975, moving from introduction in Senate committee on September 10, 1974 to being enacted on October 18; President Ford explicitly thanked "*Congress for* ***responding so quickly***" in order to "*provide a* ***shot in the arm for the housing industry***" (Ford (1974a)) when signing the bill into law. The bill was clearly enacted in response to depressed housing market conditions, with the accompanying Senate Committee report stating that the bill "***responds to a mortgage credit crisis*** *which has crippled the residential real estate industry in the United States. Housing activity in the Nation is severely depressed*" (Senate Committee on Banking (1974a), p. 1). We classify news of Ginnie's new conventional mortgage purchases under this Brooke-Cranston Tandem program authorization as having been made public in October 1974, when the bill cleared both chambers, and when the HUD Secretary released the funds immediately upon its enactment.

Example 2: Structural Budget Deficit Motives. Policies motivated by federal budget concerns are those intended to reduce public debt or those made for improved budgetary optics, such as moving programs 'off-budget' to decrease the unified budget deficit. For instance, the privatization of Fannie's sec-

ondary market operations under the Housing and Urban Development Act of 1968 (Pub. L. 90-448) was widely viewed as being largely motivated by the Johnson administration's desire to reduce federal debt (FCIC (2011), p. 38). While Congress had originally intended Fannie Mae to be chartered as a private entity, and intended to eventually privatize Fannie when it was rechartered in 1954, the timing of Fannie's eventual privatization was largely driven by budgetary concerns influencing the deliberative process of drafting the Housing and Urban Development Act of 1968. A budgetary reform commission established in 1967 had recommended moving Fannie's secondary market operations onto the Federal Budget as a matter of sound budgeting, but doing so would have increased the deficit by $2.5 billion at the time, which was considered 'untenable.' Historical background materials accompanying hearings before the Senate Committee on Banking, Housing, and Urban Affairs explained that "*spinning off Fannie's Secondary Market Operations into a separate corporation was proposed as a means of accomplishing the transition to private ownership,* ***keeping Fannie Mae from showing up on the Federal Budget****, and retiring the outstanding preferred shares owned by the US Treasury*," which would further reduce the deficit (Senate Committee on Banking, Housing and Urban Affairs (1976a), pp. 104–105). The conversion of secondary market operations to private ownership was estimated to reduce US public debt by $6 billion in 1969 (The Budget for Fiscal Year 1970 Special Analyses, p. 27), concurrent with the escalation of the Vietnam War and associated increases in defense spending and public borrowing. Federal expenditures had risen to 19.8% of GDP and the federal budget deficit had expanded to 2.8% of GDP in fiscal year (FY) 1968, or the year ending June 30, 1968, their highest levels since the Korean War and demobilization from World War II, respectively (OMB Historical Table 1-2). In his remarks upon signing the Act,

President Johnson hailed the bill as "*the most **farsighted**, the most **comprehensive**, the most massive housing program in all American history*" (Johnson (1968)); his remarks made no mention of countercyclical motivations. We classify the increase in FNMA's debt-to-capital ratio prompted by the Act's privatization of Fannie as unrelated to the business or financial cycle, as privatization was motivated by long-standing Congressional intent and budgetary concerns unrelated to the business cycle, underscored by the Act being the result of a deliberative legislative process, oriented toward long-term housing objectives, and crafted and enacted during neither a recession nor a credit crunch.

Example 3: Social Policy Objectives. Regulatory changes intended to meet social policy objectives include those deliberately aimed at increasing homeownership rates, or targeting homeownership assistance to particular demographics, such as veterans or low- and moderate-income households. For instance, when HUD's affordable housing goals for Fannie and Freddie came up for renewal in 2004 for the first time under the George W. Bush administration, aggressive new goals were set to rise every year between 2005 and 2008. HUD projected that to meet the new housing goals, Fannie and Freddie together would have to purchase an additional 400,000 goal-qualifying home loans during 2005–2008, above what they would purchase without the increase in the housing goals, or about $61 billion of additional mortgage debt based on the average balance of goal qualifying mortgages purchased in 2003 (HUD (2004)). This policy change fell under a broader policy umbrella of the administration prioritizing expanding affordable home ownership, particularly for minorities. The President had emphasized using the GSEs to promote minority homeownership in a June 2002 speech: "*Too many American families, too many minorities do not own a home. There is a **home ownership gap in America**. The difference between*

Anglo America and African American and Hispanic home ownership is too big... Fannie May and Freddie Mac, as well as the federal home loan banks, will increase their ***commitment to minority markets*** *by more than $440 billion... This means they will purchase more loans made by banks after Americans, Hispanics and other minorities, which will encourage homeownership*" (Bush (2002)). Similarly, in signing into law the American Dream Downpayment Act of 2003, President Bush emphasized that "*This administration will constantly strive to promote an ownership society in America. We want more people owning their own home. It is in our national interest that more people own their own home. After all, if you own your own home, you have a vital stake in the future of our country*" (Bush (2003)). The increased goals were clearly motivated by the administration's broader social policy objective of expanding affordable housing and minority homeownership. McLean (2015) also suggested that the Bush administration pushed HUD to increase the Enterprises' affordable housing goals in 2004 in part "*to make sure Fannie and Freddie understood who was the boss in the relationship*" as part of a broader effort to rein in the GSEs being coordinated with the Federal Reserve (McLean (2015), p. 88). We classify this increase in the GSEs' affordable housing goals as non-cyclically motivated.

Example 4: Ideological Political Preferences. Policies that are predominantly politically motivated for reasons unrelated to social policy include efforts to shrink and eventually privatize the GSEs—periodically prioritized by Republican administrations—or regulatory backlashes to public scandals or crises. For instance, in the political backlash to Fannie Mae's accounting scandals in the early 2000s, regulators capped Fannie's portfolio and forced it to achieve a 30% capital surplus above statuary minimum capital requirements after ruling that Fannie had misapplied accounting rules; in conjunction with a restatement of

earnings, OFEHO's regulatory reprisal required that Fannie Mae abruptly close a $12.5 billion hole in its capital base, which would require a significant reduction in Fannie's retained portfolio. The George W. Bush administration, which, along with the Greenspan Fed, wanted the GSEs downsized and eventually privatized, was perceived as exploiting the scandal to rein in Fannie, and later Freddie as well (McLean (2015), pp. 85–86, Greenspan (2007), p. 242). Senator Chuck Schumer, for instance, claimed that "*there are a whole lot of people who want to take advantage of the auditing problems that Fannie and Freddie have done to take the whole thing down*" (Dow Jones Capital Markets Report (5/23/2006)). Ex post, the accounting scandal and regulatory backlash appear somewhat overblown and perhaps politically exploited to an even greeter degree. The eventual restatement of Fannie's results for 2002–2004 actually resulted in an increase of shareholder's equity of $4.1 billion, the SEC and Justice Departments both eventually dropped their investigations into Fannie's accounting practices, and a civil suit against ousted Fannie CEO Raines was dismissed (McLean (2015), pp. 90–91). We classify the regulatory changes arising from FNMA's accounting scandal capital shortfalls as regulatory backlash to an unforeseen event and being motivated by longstanding political preferences, but certainly unrelated to cyclical or financial concerns.

3.4 Narrative Analysis of Government Mortgage Purchases

This section contains the discussion of individual housing credit policy changes, which are presented chronologically, in turn for each of the following agencies: the Federal National Mortgage Association, Federal Home Loan Mortgage Corporation, Government National Mortgage Association, Federal Reserve, and US

Treasury Department. We focus on policy changes since the Housing and Urban Development Act of 1968. The online appendix traces the history of FNMA back to its Great Depression origins to provide broader context regarding its charter, public mission, and the evolution and systematic nature of US federal housing credit policy. Following Freddie Mac's privatization in 1989, HUD was tasked with regulatory authority over both Fannie and Freddie, and numerous policy changes applied to both Enterprises. In these cases, the pertinent context and details regarding quantification, timing, and classification are covered thoroughly in the policy's first listing under Fannie, with minimal repetitiveness in its listing under Freddie.

3.4.1 Federal National Mortgage Association

The Federal National Mortgage Association, established by Congress in 1938, was authorized to buy FHA-insured mortgages with the objective of supporting a secondary market. To that end, Congress had intended the National Housing Act of 1934 to induce the incorporation of legally privileged private national mortgage associations, first authorized by that bill. Congress's repeated failure to induce private incorporation of such associations led to the National Housing Act Amendments of 1938, which ordered the creation of the Federal National Mortgage Association as a wholly owned subsidiary of the RFC. FNMA was transferred to the Federal Loan Agency in 1939, to the Department of Commerce in 1942, and back to the Federal Loan Agency in 1945. The Housing Act of 1948 granted an explicit statutory basis for Fannie, which was also newly authorized to deal in and support a secondary market for the new class of VA-guaranteed mortgages. In 1950, FNMA became part of the Housing and Home Finance

Agency.

Title II of the National Housing Act of 1954, titled the FNMA Charter Act, rechartered a nearly bankrupted Fannie Mae into a three part corporation, separating a special assistance function, management and liquidations function, and secondary mortgage market operations. The special assistance function amounted to a direct government lending program for certain FHA loans that were not generally acceptable to investors, primarily because of their low interest rates. The management and liquidations function was created to dispose of Fannie Mae's previously amassed mortgage portfolio in an orderly fashion, although it also continued mortgage purchases for many months because of outstanding precommitments to purchase mortgages. Secondary market operations were to continue supporting the market for FHA/VA mortgages. The 1954 Act turned Fannie Mae into a mixed-ownership corporation by requiring authorized mortgagees to purchase common stock while the federal government retained Fannie's preferred stock, transferred from the RFC to Treasury. The Act also allowed Fannie to issue debt in capital markets, subject to statutory leverage constraints. To facilitate such issuance, the secondary market facility was granted standby powers to borrow up to $1 billion from the Treasury Department, which would come to be perceived as an implicit government guarantee of Fannie's debt. The 1954 Act envisaged an eventual full privatization of Fannie Mae, but provided no timeline or mechanism for such a transition.

The Housing and Urban Development Act of 1968 split off the secondary market operations into a privatized Fannie Mae, while transferring the special assistance and management and liquidations functions to a newly created and government-retained Government National Mortgage Association (see Sec.

3.4.3). The 1968 Act gave HUD considerable regulatory authority over Fannie Mae, including the authority to require that it devote a reasonable portion of its mortgage purchases to support low- and moderate-income housing. The Act also preserved Fannie's ability to borrow from the Treasury, which reduced the perceived riskiness of its debt. Following the 1969 credit crunch, the Emergency Home Finance Act 1970 allowed Fannie Mae to expand its activities to the conventional mortgage market, subject to loan limits comparable to those applying to FHA mortgages and conditional on the approval of the HUD Secretary. The same Act also established the Federal Home Loan Mortgage Company (see Sec. 3.4.2), intended as a counterpart to Fannie, but supporting a secondary mortgage market for conventional mortgages originated by the thrift industry.

In the aftermath of the S&L crisis, the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) expanded the objectives of Fannie's secondary mortgage market operations to promote homeownership for low- and moderate-income borrowers. The Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA) created OFHEO, a new regulatory agency within HUD charged with the safety and soundness supervision of Fannie and Freddie. FHEFSSA also established statutory minimal capital requirements, instructed OFHEO to develop additional risk-based capital requirements, and mandated that HUD set and enforce affordable housing goals. Accounting scandals in the early 2000s prompted greater oversight, as well as the imposition of capital surcharges and portfolio caps. The Housing and Economic Recovery Act of 2008 abolished the OFHEO along with the Federal Housing Finance Board (FHFB), the regulator of the FHLBanks at the time, and consolidated regulatory authority in the newly formed FHFA. The Act also authorized Treasury to purchase securities issued by Fannie or Freddie. In September 2008,

both Enterprises were placed under the conservatorship of the FHFA and Treasury, and were ordered to first increase then gradually reduce their retained mortgage portfolios. Shortly thereafter, the Treasury Department and Federal Reserve began large-scale asset purchases of agency MBS and agency debt.

In this section we discuss significant policy events affecting Fannie Mae and related context, starting with the Housing and Urban Development Act of 1968. In the accompanying online appendix, we discuss Fannie's early evolution and important preceding policy events, starting with the National Housing Act of 1934.

Housing and Urban Development Act of 1968 (Pub. L. 90-448)
Enacted: August 1, 1968

Policy Change:	Increased Debt-to-Capital Ratio
Agency:	FNMA
Impact:	+$1.39 billion
News:	Oct. 1968
Effective:	Oct. 1968
Classification:	Non-Cyclical

The Act split FNMA into the Government National Mortgage Association and a quasi-private Fannie Mae, and ushered in a new era of secondary mortgage market purchases and mortgage securitization by government agencies and government-sponsored enterprises. Retained as a government corporation fully under HUD administration, Ginnie Mae assumed FNMA's management and liquidations and special assistance functions. Fannie Mae, a government-sponsored private corporation, retained the secondary market operations and

was given permission to issue MBS, which could be structured as other debt obligations or trust certificates. The purpose of the new MBS authorization was "*[t]o provide a greater degree of liquidity to the mortgage investment market and an additional means of financing its operations*" (Sec. 803(a)). The Act also authorized GNMA to guarantee timely payments of MBS issued by Fannie or other authorized issuers, and Ginnie issued the first mortgage-backed bond in 1970 (see GNMA, Sec. 3.4.3).

The Act required the retirement of all the Treasury's preferred FNMA stock and authorized issues of subordinated debt, to be included in regulatory capital, up to twice the sum of equity capital, surplus, and retained earnings. Private stockholders received two-thirds representation on Fannie's board of directors, with the remaining third to be appointed by the President, who could also remove any member of the board for good cause. The association was allowed to operate nationwide in the secondary market while being exempt from SEC disclosures and securities fees, as well as exempt from state and local income taxes. Most significantly, the newly charted Fannie also retained standby borrowing authority of up to $2.25 billion from the Treasury, and FNMA securities joined Treasuries in privileged exemption from depository institutions' portfolio limitations (Hagerty (2012), p. 40).[17]

In exchange for these privileges, the HUD Secretary received general regulatory powers over Fannie to ensure that the purposes of the newly amended FNMA Charter Act continued to be served. These powers included the ability to restrict dividends paid to stockholders and to increase Fannie's permissible debt-to-capital ratio beyond the statutory limit of 15 times its capital and

[17]The Housing Act of 1957 (Pub. L. 85-104) had increased FNMA's standby authority to $2.25 billion (see online appendix).

retained surplus. The HUD Secretary's prior approval was to be required for issuances of securities and debt obligations as well as for any changes in minimum stock retention requirements. The Act also gave the HUD Secretary the authority to require that a reasonable portion of Fannie's mortgage purchases advanced the national policy objective of providing adequate housing for low- and moderate-income families, provided these provide purchases provided "*a reasonable economic return*" to FNMA's stockholders. Through these various regulatory powers, Congress intended that "*the Secretary would participate in the decision making process as to the level of mortgage purchases at various time*" (Senate Committee on Banking and Currency (1968), p. 82). At the same time, the Act explicitly limited HUD's involvement in Fannie's activities; regulatory powers were not to extend to Fannie's internal affairs, such as staffing, salaries, and other usual corporate matters, unless to protect the financial interests of the federal government.

On September 30, 1968, a total of $250 million in subordinated debentures were sold to the public to retire the Treasury's preferred stock and share of retained earnings. This issuance exceeded the amount required for retirement by $33 million, which was added to FNMA's capital stock (Bartke (1971), p 43). Fannie had obtained a letter from the Treasury Secretary guaranteeing that, if necessary, the Treasury would make loans to Fannie to ensure the timely payments of principal and interest on its debt (Senate Committee on Banking, Housing and Urban Affairs (1976a)). Because the Treasury's guarantee letter was a deliberate, discretionary policy action that was not compelled by the Act, we view this as a distinct and significant policy change. The subordinated debentures were included in regulatory capital for Fannie's debt-to-capital restriction. On October 1, 1968, one day after the Treasury stock was retired and Fannie

became a private corporation, the HUD Secretary increased Fannie's debt-to-capital limitation on secondary market facility borrowing leverage from 15 to 20 times Fannie's regulatory capital (33 FR 14779). Based on regulatory capital of $452.1 million at the end of calendar year 1968 (FNMA Annual Report 1969, p. 19) and taking into account the $33.0 million capital stock addition aided by the Treasury yields an estimated potential portfolio expansion of up to $2.79 billion ($452.1 × (20+1) - ($452.1 million - $33.0 million) × (15+1) = $2.79 billion).[18] Using the two-year rule, we assign one half of that amount as an annualized increase in Fannie's portfolio capacity of $1.39 billion starting October 1968.

The Act amended Fannie's statutory purpose under Section 301 of the FNMA Charter Act to read as follows (revisions underlined):

"*SEC. 301. The Congress hereby declares that the purposes of this title are to establish secondary market facilities for home mortgages, to provide that the operations thereof shall be financed by private capital to the maximum extent feasible, and to authorize such facilities to (a) provide supplementary assistance to the secondary market for home mortgages by providing a degree of liquidity for mortgage investments, thereby improving the distribution of investment capital available for home mortgage financing; (b) provide special assistance (when, and to the extent that, the President has determined that it is in the public interest) for the financing of (1) selected types of home mortgages (pending the establishment of their marketability) originated under special housing programs designed to provide housing of acceptable standards at full economic costs for segments of the national population which are unable to obtain adequate housing under established home financing programs, and (2) home mortgages generally as a*

[18] It is not possible to use ex ante balance sheet data in this one particular case, as the balance sheet of the Federal National Mortgage Association prior to enactment of the Housing and Urban Development Act of 1968 was split between Ginnie and Fannie, rendering December 1968 the earliest baseline available for the newly privatized Fannie's regulatory capital.

means of retarding or stopping a decline in mortgage lending and home building activities which threatens materially the stability of a high level national economy; and (c) manage and liquidate federally owned mortgage portfolios in an orderly manner, with a minimum of adverse effect upon the home mortgage market and minimum loss to the Federal Government."

Of note, the revisions to Fannie's statutory purpose underscore Congressional intent to sponsor multiple secondary markets and to manage multiple federally owned mortgages portfolios, as opposed the narrower scope of "*the existing mortgage portfolio of the Federal National Mortgage Association*" as set by the National Housing Act of 1954.

The privatization of Fannie's secondary market operations is widely viewed as being largely motivated by the administration's desire to reduce federal debt (FCIC (2011), p. 38). A budgetary reform commission established in 1967 had recommended moving Fannie's secondary market operations onto the Federal Budget as a matter of sound budgeting, but doing so would have increased the deficit by $2.5 billion at the time, which was viewed as 'untenable.' Historical background materials accompanying hearings before the Senate Committee on Banking, Housing, and Urban Affairs explained that "*spinning off Fannie's Secondary Market Operations into a separate corporation was proposed as a means of accomplishing the transition to private ownership,* ***keeping Fannie Mae from showing up on the Federal Budget****, and retiring the outstanding preferred shares owned by the US Treasury,*" which would instead reduce the deficit (Senate Committee on Banking, Housing and Urban Affairs (1976a), pp. 104–105). The conversion to complete private ownership reduced Federal debt by about $6 billion (The Budget for Fiscal Year 1970 Special Analyses, p. 27). The escalation of the Viet-

nam War, in conjunction with the Great Society expansions of social insurance, were adding to concerns about the budgetary outlook. The HUD Secretary also underscored that the transfer of FNMA's secondary market operations to entirely private ownership fulfilled the intent of Congress when it had rechartered FNMA in 1954 (Senate Committee on Banking and Currency (1968)), but the timing of the transition appears to be explained by budgetary motives.[19]

The accompanying committee report also underscored that the Act was the result of a multi-year deliberative process seeking to address longer-term homeownership goals unrelated to stabilization. The report framed the bill as intended to meet the President's proposed "*program of Federal assistance for the construction and rehabilitation of 6 million housing units* ***over a 10-year period*** *for the* ***low and moderate income families*** *of this country,*" which had been requested in his State of the Union Address to Congress, delivered January 17, 1968. With the Act, Congress established an even more aggressive new national goal of creating 26 million new dwelling units over the next decade (Senate Committee on Banking, Housing and Urban Affairs (1976a), p. 66). In his remarks upon signing the Act, President Johnson hailed the bill as "*the most* ***farsighted****, the most* ***comprehensive****, the most massive housing program in all American history*," framing the bill as the capstone to more than three decades of housing policy that began with "*President Franklin D. Roosevelt's conviction that a compassionate and farsighted government cannot ignore the plight of the ill-housed or the ill-fed or the ill-clothed*" (Johnson (1968)). His remarks made no mention of countercyclical motivations or other short-term policy objectives.

[19]Federal expenditures had risen to 19.8% of GDP and the federal budget deficit had expanded to 2.8% of GDP in fiscal year (FY) 1968, or the year ending June 30, 1968, their highest levels since the Korean War and demobilization from World War II, respectively (OMB Historical Table 1-2).

The *Federal Reserve Bulletin*'s October 1968 overview of construction and mortgage markets highlighted record construction volumes and strong levels of housing starts, with demand buoyed by a two-year backlog of under-building. The Fed further noted that disintermediation fears had eased considerably since June (Federal Reserve Bulletin October 1968, p. 787). The Fed characterized the Act as "*extremely comprehensive*" but noted that implementation of much of the Act "*will be delayed because of funding requirements and time needed to develop and adjust to new regulations. Consequently, although the long-run implications are very substantial, only a limited net stimulus to residential and other construction in particular to real estate markets in general may be realized from this legislation during the current fiscal year*" (Federal Reserve Bulletin October 1968, p. 789).

We classify the increase in FNMA's debt-to-capital ratio prompted by the Act's privatization of Fannie as unrelated to the business or financial cycle, as privatization was motivated by long-standing Congressional intent and budgetary concerns unrelated to the business cycle, underscored by the Act being the result of a deliberative legislative process, oriented toward long-term housing objectives, and crafted and enacted during neither a recession nor a credit crunch.[20]

HUD Increase of Debt-to-Capital Ratio (34 FR 19656)

Announced: December 4, 1969

[20]The dating of pre-1986 credit crunches is from Eckstein and Sinai (1986). The dating of post-1986 crunches is based on Owens and Schreft (1993) for the 1990 commercial real estate crunch, Lehnert, Passmore, and Sherlund (2008) for the 1998 Russian default/LTCM crisis, and Bordo and Haubrich (2010) for the 2007/08 financial crisis. As Eckstein and Sinai (1986) note, recessions are often led by such periods of credit shortages. Recession dates are from the National Bureau of Economic Research.

Policy Change:	Increased Debt-to-Capital Ratio
Agency:	FNMA
Impact:	+$1.13 billion
News:	Dec. 1969
Effective:	Dec. 1969
Classification:	Cyclical
Policy Change:	Treasury-Guaranteed Capitalization
Agency:	FNMA
Impact:	+$2.6 billion
News:	Apr. 1970
Effective:	Apr. 1970
Classification:	Cyclical

On December 4, 1969, HUD Secretary George Romney, recently appointed by the incoming Nixon administration, again increased Fannie's permissible debt-to-capital ratio for secondary market operations from 20 to 25 times its regulatory capital, effective December 8, 1969 (34 FR 19656). Using regulatory capital of $452.1 million at the end of calendar year 1968 (FNMA Annual Report 1969, p. 19) yields an estimated portfolio expansion of up to $2.26 billion ($452.1 million × (25 - 20) = $2.26 billion). Using the two-year rule, we assign an annualized increase in FNMA's purchase capacity of $1.13 billion starting in December 1969, when the leverage change was first announced.

The move took place as the Nixon administration sought to 'get control' of Fannie during its transition to private ownership by sacking and eventually ousting Fannie's President, Raymond Lapin—a Democrat and Johnson administration appointee supposedly uncooperative with Romney and the Republi-

can White House. Lapin publicly fought and legally challenged his removal without cause, but eventually conceded (Hagerty (2012)), pp. 43–45). This partisan power struggle during Fannie's transition suggested that FNMA was not as independent as the 1968 Act had intended, and presaged that FNMA would remain a political football in the coming decades.

On April 1, 1970, Fannie sold another $200 million in subordinated debentures with an accompanying Treasury letter—again guaranteeing timely repayment with a Treasury backstop—allowing a further portfolio expansion of up to $5.2 billion ($200 million × (25+1) = $5.2 billion). Because the Treasury's guarantee letter was a deliberate, discretionary policy action and unrelated to the HUD Act of 1968, we view this as a distinct and significant policy change. Moreover, Fannie was still in the midst of transitioning between a publicly owned and shareholder owned enterprise. Using the two-year rule, we assign an annualized increase in FNMA's purchase capacity of $2.6 billion starting in April 1970.

The transitional period towards private ownership officially ended on May 21, 1970, when the HUD Secretary signed a proclamation converting Fannie from a government agency to a private corporation. On August 31, FNMA stock was traded for the first time on the New York Stock Exchange (NYSE). As a result of "*the increasing market acceptance for FNMA's subordinated debt*," no Treasury letter was requested for subsequent issues, and no explicit government guarantee was volunteered (Senate Committee on Banking, Housing and Urban Affairs (1976a), p. 232).

The economic environment had shifted markedly between the HUD Secretaries' first and second increase of Fannie's debt-to-capital ratio during the transition period. Hearing transcripts from the Senate Committee on Bank-

ing, Housing, and Urban Development explicitly cited that the second leverage increase was the consequence of Fannie's portfolio growth "***during a period of tight money***" (Senate Committee on Banking, Housing and Urban Affairs (1976a), p. 110). The *Federal Reserve Bulletin*'s July 1969 overview of mortgage, construction, and real estate markets cited that residential construction activity had been declining since January, also noting "***a growing dissatisfaction among financial investors with mortgages***—*as with all types of fixed-income investments*" in the prevailing inflationary environment (Federal Reserve Bulletin July 1969, p. 565). HUD's second debt-to-capital ratio increase during Fannie's transition period was granted during what would later be classified as the credit crunch persisting from 1969Q1 through 1970Q1, as dated by Eckstein and Sinai (1986). In December 1969, the economy entered a recession lasting through November 1970. The *Federal Reserve Bulletin*'s March 1971 overview of mortgage, construction, and real estate markets noted that housing starts bottomed out in early 1970, after monetary policy had transitioned to accommodation, and housing construction bottomed out in July (Federal Reserve Bulletin March 1971, p. 167). Consequently, we classify both these transition-support policy changes as cyclically motivated.

Housing and Urban Development Act of 1969 (Pub. L. 91-152)
Enacted: December 24, 1969

The Act extended various authorizations from the Housing and Urban Development Act of 1968 by one- to- two-years. Most pressingly, authorization of the FHA's mortgage insurance program had been set to expire on October 1, 1969, and a temporary extension had to be authorized while work on the Act was completed (Pub. L. 91-78, enacted September 30, 1969). The Act increased

FHA mortgage insurance loan limits by 10%, raising the limit on Section 203(b) mortgages—and hence FNMA's loan limit for secondary market purchases—from $30,000 to $33,000.[21] The Senate version of the bill would have increased the FHA loan limits by $2,500 while also indexing loan limits to the annual change in the average sales price of new homes, but the conference committee adopted the House's approach of a one-off percentage increase. In conjunction with the bill's enactment, the Federal Housing Commissioner issued a rule on December 24 increasing the FHA loan limit, along with other adjustments to FHA programs (35 FR 284).

Insufficient references and documented estimates could be found in the historical record to reliably quantify a projected impact of this loan limit increase, so this policy change is not considered significant. If it could be quantified, however, it would be classified as cyclically motivated. Cyclical concerns had been flagged as Congress began working on the bill in July 1969, and the final bill was enacted in the midst of the 1969 credit crunch. When pressed by members of the House Committee on Banking and Currency Subcommittee on Housing about falling housing starts, Secretary Romney had warned in July 1969 testimony that "*We are experiencing a* ***credit crunch*** *that certainly in terms of interest rates and tightness of money exceeds that of 1966*" (House Committee on Banking and Currency (1969a), p. 7). The Annual Report of the Federal Reserve for 1969 noted that liquidity pressures had markedly intensified for thrifts in the latter half of the year, and that FNMA and the FHLBB were trying to "*channel a large volume of funds into housing finance*" (Annual Report of the Federal Reserve for 1969, p. 6).

[21] On February 3, 1967, Fannie had established that it would purchase mortgage loans of up to the FHA's Section 203(b) loan limit, reversing an earlier policy intended to conserve cash. See the online appendix.

Emergency Home Finance Act of 1970 (Pub. L. 91-351)

Enacted: July 24, 1970

Policy Change:	Conforming Mortgage Program Approval
Agency:	FNMA
Impact:	+$0.4 billion
News:	Nov. 1971
Effective:	Oct. 1968
Classification:	Feb. 1972

Unprecedented volumes of housing subsidies for low-income families provided by the Housing and Urban Development Act of 1968, as well as Fannie's rapidly expanding support of the FHA/VA market in 1968 and 1969, gave rise to concerns that middle income families were being neglected by federal housing policy (HUD (1987), pp. 29–30). According to a Treasury Department report, Congress was also seeking to more efficiently resolve chronic regional mismatches between savings deposits and the demand for mortgage credit (Treasury (1990), p. B-1). Among other concerns motivating calls for renewed housing finance reform, Bartke (1972) cited the declining share of national resources invested in housing, the fact that the housing sector had consistently borne the brunt of tight money policies, and views that the burdens of monetary policies should be shared more equitably.

Legislation was introduced in Congress in September 1969 that would, among other things, permit Fannie to expand into the conventional mortgage market, conditional on the HUD Secretary's approval. The bill additionally proposed establishing a new GSE to provide secondary market support for the S&L industry. The Federal Reserve expressed strong reservations to Congress

expanding secondary mortgage market operations, but the Emergency Home Finance Act of 1970 was nonetheless enacted on July 24, 1970, its passage aided by robust support from segments of the housing and mortgage industries. The enacted bill created the Federal Home Loan Mortgage Corporation to support a secondary market for conventional loans originated by the S&Ls (see FHLMC, Sec. 3.4.2), and also extended Fannie's purchase authority to include the conventional market, again subject to the HUD Secretary's approval. The Act also authorized HUD to make certain interest-subsidy payments to Fannie for mortgages purchases during periods of high mortgage rates, and provided Ginnie with increased special assistance purchase authority (see GNMA, Sec. 3.4.3).

Fannie's purchases of conventional loans would initially be statutorily limited to mortgages 'conforming' to a number of underwriting standards. LTVs were not to exceed 75% unless the seller (1) retained a 10% participation, (2) agreed to repurchase the loan in case of default within three years, or (3) the amount of the loan in excess of 75% was privately guaranteed or insured. Conforming mortgage amounts could not exceed limits under the FHA Section 203(b) program, currently set at $33,000 as of December 24, 1969 (see above). The conforming loan limits were intended to avoid diversion of scarce credit from housing production for low- and moderate-income households.[22]

The stated purpose of the conventional mortgage program was not only to pump a modest amount of additional funds into housing, but also to eventually popularize a more standardized and marketable conventional mortgage instrument. An accompanying committee report stressed that expansion into the conventional mortgage market was not intended to compromise Fannie's primary

[22]Conventional mortgages with loan values exceeding the conforming loan limit are termed 'jumbo' mortgages.

role supporting a secondary mortgage market for FHA/VA mortgages, noting "*the committee has been assured that FNMA will take whatever action is appropriate to prevent its expansion into the conventional field from jeopardizing the soundness of its credit or from adversely affecting its traditional role in buying and selling FHA and VA mortgages. The committee wants to remind FNMA that it was set up primarily for FHA and VA mortgages and that conventional mortgage purchasing should in no way diminish its support of the FHA and VA market*" (Senate Committee on Banking and Currency (1970), p. 7). Contrary to Congressional intent, Fannie's purchases of conventional mortgages would quickly surpass those of FHA/VA mortgages in 1976 (HUD (1983)).

On December 3, 1970, Fannie announced tentative details of its pending new conventional program, stating that it aimed to purchase between $300 and $500 million of conventional loans in 1971 (The Wall Street Journal (12/3/70)). Conventional mortgages for single-family owner-occupied houses were to be purchased via a free market system auction, similar to its purchases of FHA/VA mortgages. Noting that its tentative plan was already being postponed one month because of a rights issue, Fannie stated that it hoped to enter the market by February 1971, conditional on approval from the HUD Secretary, which the agency hoped to secure by January 1, 1971. Preliminary program approval to buy conventional mortgages was granted in a letter from the HUD Secretary to Fannie's president on January 25, 1971. The final authorization and implementation of the program was, however, significantly delayed because of the difficulties involved with drafting uniform mortgage contracts and other instruments needed for packaging loans from across the United States, and there was considerable uncertainty about when the program would launch. Fannie and Freddie had struggled for months to negotiate uniform contracts, and eventu-

ally failed to reach compromise over prepayment options; Fannie's proposed contracts, published in November, would have allowed prepayment without penalty and allowed the buyer of an existing home to assume the previous owner's mortgage; on the insistence of the thrifts, Freddie's contracts included prepayment penalties and non-assumption provisions (The Wall Street Journal (12/16/71)). Consumer and civil rights groups—strongly favoring penalty free prepayment options—had also slowed the development of contracts, and under pressure, Fannie revised its conventional mortgage guidelines in late 1971. On November 15, 1971, it was announced that HUD Secretary Romney had approved Fannie's standardized mortgage forms, clearing the final major regulatory hurdle ahead of launching conventional secondary market operations (The Wall Street Journal (11/15/71)).

In a news conference on December 15, 1971, Fannie announced the first auction involving conventional mortgages on single-family homes, to take place in February 1972 (The Wall Street Journal (12/16/71)). The first conventional single-family mortgage purchase was made on February 15, 1972. In May 1971, Fannie Mae President Oakley Hunter had projected that conventional mortgage purchases would initially not exceed $400 million per year (Hunter (1971) p. 834), which was consistent with the prior target range of $300 million to $500 million for the first year of operation. We assign that estimate of an annualized $400 million for the year starting November 1971, upon Secretary Romney's approval of the consequential standardized mortgage contracts, as the initial impact upon Fannie's portfolio from program expansion into the conventional market. In practice, Fannie purchased conventional mortgages totaling $55 million in 1972, $939 million in 1973 and $1.129 billion in 1974 (FNMA Annual Report 1975, p. 14).

The Act opening the doors for Fannie to enter the conventional market was passed in the midst of the recession lasting from December 1969 through November 1970, but unlike certain other provisions, Fannie's new authorization was not representative of the Act's title. The accompanying Senate committee report characterized the Act as "*designed to encourage and expedite the construction and financing of a substantial number of new and existing homes. Primary emphasis is placed on the expansion of existing mortgage credit facilities and the* ***creation of new secondary market facilities to broaden the availability of mortgage credit***" (Senate Committee on Banking and Currency (1970), p. 2). That report's general statement opened with economic concerns and countercyclical motivations: "*It is obvious to the committee that economic conditions in this Nation are approaching a critical level, and that* ***immediate action is necessary if we are to avoid a further drop in the economy*** *and possibly a serious recession by the end of the year... Unfortunately, the policies currently being used by the administration to fight inflation are having an extremely disastrous effect on housing*" (Senate Committee on Banking and Currency (1970), p. 1). The subsequent House committee report accompanying that chamber's bill, on the other hand, acknowledged varying short-run cyclical concerns and longer-run policy objectives behind the expansions of secondary mortgage market operations: "*The home buying public, the mortgage lending institutions, and the homebuilding industry are confronted with the highest interest rates in a century and an extreme scarcity of mortgage credit.... While this bill is an attempt to alleviate the immediate crisis, the committee will continue to work toward a solution to provide serious and* ***long-term changes to provide new sources of funds for mortgage credit***" (House Committee on Banking and Currency (1970), pp. 4–5).[23]

[23]The House report included the following estimate of the disproportionate impact of monetary tightening on housing: "*One member of the Federal Reserve Board has calculated that, whereas the home construction industry accounts for approximately 3 percent of the gross national product, 70 per-*

Contrary to these nods to near-term stabilization, House Committee on Banking and Currency Chairman Wright Patman lambasted that the only provision to improve the near-term housing outlook was the appropriation of $250 million to the FHLBanks for a mortgage interest rate subsidy, stating that the bill "*may contain some useful sections, but it nevertheless completely fails to provide a meaningful response to the Nation's housing crisis... The bill, in its present form, does not add one dollar to the country's pool of mortgage funds and because of this* ***it is an Emergency Home Finance Act in name only****. The* ***real effect of the bill in its present form is to appropriate more money to subsidize high interest rates*** *on loans made from a pool of mortgage funds that is now and will continue to be entirely inadequate to meet the Nation's housing needs*" (House Committee on Banking and Currency (1970), p. 16).

In his statement upon enacting the law, President Nixon emphasized the legislation as intended to "*alleviate the Nation's critical housing shortage*," both to meet "*growing demand for housing but also to make up the large housing deficit which has accumulated over the past 4 years, and to permit people to move from the many substandard housing units which are now in existence*" (Nixon (1970)). The statement noted that "*housing production is still substantially below desirable levels*," but the emphasis was on permanently increasing the housing stock to meet demand, not increasing home production to stabilize the economy.

Moreover, the House report explicitly characterized the authorization for FNMA to enter conventional mortgage secondary market operations as foreword looking, acknowledging that it would take too long to implement to alleviate the current credit crunch and hasty action would be imprudent: "*If,*

cent of the impact of a tight-money policy falls on the home construction industry" (House Committee on Banking and Currency (1970), pp. 11–12).

as seems likely, the current money market situation should continue for some time, ***FNMA should not implement this authority immediately****. A great deal of spade-work should be done in the way of establishing an appraisal system, drafting uniform mortgage documents and making other preparations before FNMA could engage in the buying and selling of conventional mortgages to any significant degree. The time to begin these undertakings is now, so that FNMA will be ready to begin encouraging and* ***supplementing a market for conventional mortgages when the pressure on the FHA and VA market has eased****"* (House Committee on Banking and Currency (1970), p. 7). The Senate report contained nearly identical language (Senate Committee on Banking and Currency (1970), p. 7). And as noted above, Fannie's final authorization by the HUD Secretary and subsequent first conventional mortgage purchases both took place more than a year after the recession of December 1969 to November 1970 had ended, following a long, deliberative process of drafting mortgage contracts.

While short-term provisions for targeted mortgage purchases by Ginnie Mae and interest rate subsidies through the FHLBanks were intended to take effect during the recession and were clearly cyclically motivated, we take exception in classifying FNMA's conventional market program approval and subsequent expansion into that market as unrelated to the business and financial cycle, given its stated longer-term objective and intended delay in implementation (see also listings under FHLMC, Sec. 3.4.2, and GNMA, Sec. 3.4.3). The Act's overhaul of US secondary market operations was principally intended to improve the efficiency of mortgage markets by spreading credit from regions with excess savings to markets with high credit demand, and to improve the efficiency of secondary mortgage markets by standardizing contracts across the countries, neither of which was understood to be capable of ameliorating the housing credit

shortage prevailing at the time of the bill's enactment.

Housing and Community Development Act of 1974 (Pub. L. 93-383)

Enacted: August 22, 1974

Policy Change:	Conforming Loan Limit
Agency:	FNMA
Impact:	+$1.14 billion
News:	Aug. 1974
Effective:	Aug. 1974
Classification:	Non-Cyclical

The Act decoupled the limit on the outstanding balance of a conventional mortgage eligible for purchase by Fannie and Freddie from the FHA Section 203(b) mortgage insurance limit, and instead tied it to the Section 5(c) limit for mortgages originated by insured S&L associations. Prior to the bill's enactment, the Section 5(c) limit was set at $45,000, above the $33,000 Section 203(b) limit currently limiting Fannie's purchases. The reason for the change had more to do with Freddie than with Fannie (HUD (1987)). As the Senate Committee on Banking, Housing, and Urban Affairs report explained, it was "*not realistic to permit savings and loans to originate $45,000 mortgages and to restrict [Freddie] to the purchase of mortgages with a maximum principal mortgage tied to a varying FHA limit*" (Senate Committee on Banking (1974b), p. 85). The change for Fannie apparently followed in order to roughly maintain parity between both GSEs (HUD (1987), p. 35). Adopted from the House bill, the Act also raised the FHA 203(b) limit to $45,000 and the S&Ls Section 5(c) limit to $55,000, with up to an additional 50% for dwellings in Alaska, Guam, and Hawaii. Hence the Act raised the conforming loan limit for conventional mortgages by 66.67%,

from $33,000 to $55,000. The conforming loan limit changes were effective upon enactment.

The House committee report stated that raising FNMA's loan limit from $33,000 to $55,0000 "*would permit FNMA to serve much the same housing market in terms of constant dollars as it was authorized to serve when the Emergency Home Finance Act was enacted [in July 1970]*" (House Committee on Banking and Currency (1974), p. 29). The increase in the 5(c) limit was intended to "*help adjust the limit in line with the substantial increases that have occurred in recent years in the cost and value of single-family homes, particularly in the nation's high-cost areas*" (House Committee on Banking and Currency (1974), p. 43). The Senate committee report noted that "*single-family housing costs have increased between 20 and 25 percent since late 1969 when the FHA section 203 (b) limit was last set*" (Senate Committee on Banking (1974b), p. 86). That report also noted that "*of the new homes built for sale today, 35% are now priced at $35,000 or over; 22% are priced at $40,000 or over. A recent study indicates that 25% of the sales of existing single-family homes in the second quarter of 1973 were over $40,000; 46.6% were over $30,000.*"

The Act also increased the limit on the Enterprises' holdings of conventional mortgages originated more than one year prior to purchase, from 10% to 20% of their aggregate portfolio. Other eligibility restrictions were relaxed and the LTV restriction for conventional mortgage purchases was lifted from 75% to 80% of the value of the property securing the mortgage, unless the seller (1) retained a participation of at least 20% (up from 10%), (2) the seller agreed to repurchase the mortgage on demand, or (3) the excess over 80% was privately guaranteed or insured. The portfolio and LTV relaxations were deemed necessary in light of housing cost increases since the 1960s.

To quantify the impact of the increase in FNMA's conforming loan limit, we assume, pursuant to the House and Senate committee report language, that the change would have restored FNMA's real purchasing power relative to purchase volumes surrounding the December 1969 Section 203(b) increase and July 1970 enactment of the Emergency Home Finance Act. The $5.93 billion net purchase volume over 1969Q4 through 1970Q3 would have translated to $7.9 billion at the end of June 1974, adjusted for the 33.3% increase in OFHEO's seasonally adjusted Constant-Quality House Price Index for new homes sold over 1970Q3 and 1974Q2.[24] Relative to the $6.77 billion net purchase volume over 1973Q3 through 1974Q2, the year before enactment of the Housing and Community Development Act of 1974, this represents an increase of $1.14 billion, which we assign to the year starting August 1974, when the conference committee resolved policy disagreements on the conforming loan limit.[25] In practice, Fannie's retained portfolio increased $2.41 billion in the year starting in 1974Q3, with its net purchase volume decelerating slightly to $5.09 billion for the year, down slightly from $6.77 billion in the preceding year.

While these policy changes were enacted in the midst of the recession lasting from November 1973 through March 1975, there is exhaustive evidence that the bill's origins considerably preceded the recession, and that the timing of the bill's enactment predominantly reflected the breaking of a longstanding political impasse unrelated to the business or financial cycle. The purpose of the bill stated in its preamble was "*[t]o establish a program of community development block grants, to amend and extend laws relating to housing and urban development, and for*

[24] We use annual volumes to smooth out seasonality and other idiosyncratic sources of volatility.

[25] The House bill containing the eventually enacted provisions was finalized in June 1974, but the pertinent differences with the Senate bill's smaller increase in the conforming loan limit was not resolved until the August 1974 conference committee bill.

other purposes." The accompanying Senate committee report asserted that "*the main thrust of the proposed legislation is to consolidate and simplifying existing [housing and community development] programs*," and noted that the origins of the bill stemmed from the administration's proposal for program consolidation in 1970, and subsequent failure of the House to act on a Senate-passed bill during the 92nd Congress (Senate Committee on Banking (1974b), pp. 1–3).[26] Similarly, the supplemental views of Senators Tower, Packwood, and Brock in the accompanying committee report emphasized that "***The bill reflects the fact that major housing and urban development legislation has been delayed many years, with the last comprehensive bill enacted in 1968.*** *It is a long and complex measure...*" (House Committee on Banking and Currency (1974), p. 165).

The drive to resolve the multi-year congressional political impasse and pass a comprehensive housing bill had been amplified when the Nixon administration halted several HUD programs in January 1973, well ahead of the recession, based on ideological opposition to the recent Great Society housing legislation; one month later, the administration proposed entirely defunding community development programs in its FY1974 budget request.[27] While the Senate and

[26]The House rules committee killed the 1972 bill by refusing to grant a rule for floor consideration. Underscoring the same point, the introduction and background of the bill in the House committee report explained: "*The committee bill is the product of an extensive period of hearings and studies brought about by two acts of critical importance to Federal housing and urban development efforts: first, the rejection by the House Rules Committee in late 1972 of an omnibus housing bill which would have, in part, continued and expanded highly controversial housing subsidy programs; and second, the suspension of these pro- grams by the President in January 1973.*" There is no mention of business or financial cycle concerns motivating the bill, but overwhelming concern with an "*effort to break the deadlock over HUD's housing and community development programs so that the Nation can resume its activities in these areas with broad political support*" (House Committee on Banking and Currency (1974), pp. 1–2).

[27]*CQ Almanac* offered the following summary: "*On Jan. 8, 1973, the Nixon administration announced a moratorium on all new commitments for major subsidized housing and urban programs in order to review what former HUD Secretary George Romney called 'the entire Rube Goldberg structure' of housing and urban development laws. The moratorium also included a temporary suspension of interest subsidy programs for home ownership (section 235) and for rental and cooperative housing (section 236) under the National Housing Act. In addition, the administration's fiscal 1974 budget request did not include funds for community development programs, scheduled to be phased out and replaced in fiscal*

companion House bills were introduced in February 1974 and June 1974, respectively, the Act was related to a myriad of stalled housing bills, as there had been no comprehensive housing policy authorization since the Housing and Urban Development Act of 1969.[28] According to *CQ Almanac*, the Senate version of the bill largely resuscitated the bill killed by the rules committee in 1972, while making additional concessions to the Nixon administration (CQ (1975a)). Despite the Senate's compromises, the HUD Secretary had threatened that President Nixon would veto the Senate draft, and the bill was only eventually enacted in the first month of the Ford administration, following President Nixon's resignation on August 9, 1974. This additional political risk and uncertainty surrounding a veto threat further substantiate the determination that news of the policy change was only materially made public in August 1974, concurrent with the conference agreement, and that the timing of enactment was unrelated to the recession.

In his statement on signing the Act, President Ford touted the legislation as "*far-reaching and perhaps historic significance, for it not only* ***helps to boost the long-range prospects for the housing market*** *but also marks a complete and welcome reversal in the way that America tries to solve the problems of our urban communities...****No one expects this bill to bring substantial immediate relief to the housing market,*** *but over the* ***long haul*** *it should provide the foundations for better housing for all Americans*" (Ford (1974b)).

1975 by the President's proposed urban community development revenue-sharing plan" (CQ (1975a)).

[28]Prominent related bills include the Housing and Urban Development Act of 1970 (91 H.R. 16643); Housing and Urban Development Act of 1971 (92 H.R. 9688); Middle and Low Income Housing Act of 1971 (92 H.R. 1574); Community Development Assistance Act of 1971 (S. 2333); Housing and Urban Development Act of 1972 (92 S. 3248); Community Development Assistance Act of 1973 (S. 1744); Housing and Urban Development Act of 1973 (93 H.R. 10036); and the Housing Act of 1973 (93 S. 2507). ProQuest Legislative Insight cites more than 80 related bills introduced between 1969 and 1974.

Given the bill's multi-year, stalled development, long-term, comprehensive focus on overhauling housing policy, and timing reflective of breaking of a long-standing political impasse unrelated to the business cycle, we classify the bill and conforming loan limit increase as unrelated to the business cycle.

Housing and Community Development Act of 1977 (Pub. L. 95-128)

Enacted: October 12, 1977

Policy Change:	Conforming Loan Limit
Agency:	FNMA
Impact:	+$4.82 billion
News:	Oct. 1977
Effective:	Oct. 1977
Classification:	Non-Cyclical

The Act raised the FHA 203(b) single-family limit from $45,000 to $60,000 and the S&Ls Section 5(c) single-family limit from $55,000 to $60,000. The Act also increased the conforming loan limits for conventional mortgages to 125% of the 5(c) loan limit, thereby increasing Fannie's loan limit for purchases from $55,000 to $75,000 on net. The conforming loan limit changes were again effective upon enactment.

The committee report accompanying the House bill, which more closely resembled the enacted law, explained that high rates of inflation compelled the loan limit increases, particularly to the FHA 203(b) limit: "*The most recent increase to $45,000 for the section 203(b) basic homeownership program (authorized by the Housing and Community Development Act of 1974) has not been adequate to restore the maximum [mortgage amount] to the same relationship to the price of new homes as prevailed in the mid-1960's when the FHA insured 15.3 percent of the new*

home market. In fact, the current limits have resulted in the widest gap between the maximum mortgage amounts and new home prices that has ever existed. To eliminate the gap, the committee bill establishes a new maximum insurable amount of $60,000 for the section 203(b) program. The new limit is designed both to reflect increases in the prices of homes and mortgage amounts since 1974 and to anticipate likely increases for at least the near future" (House Committee on Banking (1977a), p. 16). That report explained that increasing the 5(c) loan limit from $55,000 to $60,000, as adopted in the enacted conference report, was viewed as consistent with increasing the 203(b) loan limit from $45,000 to $60,000, and that the 25% higher conforming loan limit for Fannie and Freddie was "*necessary to adjust the limit to the increased cost and value of single-family homes, particularly in high-cost areas*" (House Committee on Banking (1977a), pp. 21, 25).

The Senate Committee report, based on a bill that would have increased the 5(c) limit from $55,000 to $65,000 without further increasing the Enterprises' loan limits, similarly stated that proposal was taken "*in response to the substantial increases in housing costs which have occurred since the ceilings were raised in 1974*" (Senate Committee on Banking, Housing and Urban Affairs (1977), p. 32). Unlike their House counterparts, the Senate committee had deliberately rejected a proposal to do more for high-cost areas. The conference committee also rejected a proposal to further increase the loan limits in high-cost areas, opting instead "*to adjust the maximum loan limit to keep pace with inflation, while preserving these limits as meaningful ceilings*" (House Committee on Banking (1977b)), but adopted the 25% higher purchase limit for the Enterprises from the House bill.

To quantify the impact of the increase in FNMA's conforming loan limit, we assume, pursuant to the House and Senate committee report language, that the

change would restore FNMA's real purchasing power relative to purchase volumes around the enactment of the Housing and Community Development Act of 1974 (see above). The $7.43 billion net purchase volume over 1973Q4 through 1974Q3 would have translated to $9.98 billion at the end of September 1977, adjusted for the 34.3% increase in OFHEO's seasonally adjusted Constant-Quality House Price Index for new homes sold over 1974Q3 and 1977Q3. Relative to the $5.16 billion net purchase volume over 1976Q4 and 1977Q3, the year before enactment of the Housing and Community Development Act of 1977, this would have represented an increase of $4.82 billion, which we assign to the year starting October 1977.[29] To the extent that the enacted provisions were meant to anticipate further near-term inflation, we view this as a conservative estimate. In practice, Fannie's net purchase volume more than doubled to $10.44 billion in the year starting in 1977Q4, up $5.28 billion from the preceding year.

In his remarks upon signing the Act, President Jimmy Carter noted that "*There's* ***no immediate solution*** *that can be offered*" to the housing needs of older and more distressed communities, and emphasized that the Act's cornerstone funding for the Community Development Block Grant would span the next three years (Carter (1977)). There was no mention of housing starts or contemporaneous economic conditions, or immediate stimulus to the housing market. Similarly, the accompanying report of the Senate Committee on Banking, Housing, and Urban Affairs made no mention of near-term economic or other countercyclical motives (Senate Committee on Banking, Housing and Urban Affairs (1977)). Given the bill's long-term and comprehensive focus on overhauling housing policy, coupled with the lack of any discernible cyclical motive, we

[29] As a major policy difference regarding the Enterprises' purchase limit was resolved in conference, our determination of the news of the policy change being made public is based on the conference agreement. The Senate agreed to the conference report on October 1, 1977 and the House agreed to the conference bill on October 4, 1977.

classify the conforming loan limit increase as unrelated to the business cycle.

Expansion to Conventional Multifamily Mortgages

Effective: February 1, 1978

On January 20, 1978, Fannie announced that conventional mortgages on two-to-four family houses would become eligible for purchase on February 1, 1978. Fannie Mae's Chairman Oakley Hunter explained that "*We expect that this broadening of our conventional program should be especially helpful in urban areas, many of which have a large existing stock of two-to-four-family structures*" (The Washington Post (1/21/1978)). Because Fannie's entry into multifamily conventional mortgages does not appear to have required regulatory approval, it is not considered a significant policy change.

1978 HUD Regulations (43 FR 36200)

Issued: August 15, 1978

At the start of the Carter administration, HUD officials and some key members of Congress voiced concerns that Fannie had been putting too much emphasis on profit margins for its stockholders and was not fulfilling its public mission of advancing national housing goals. In hearings before the Senate Committee on Banking, Housing, and Urban Affairs on June 7, 1977, newly appointed HUD Secretary Patricia Roberts Harris rebuked FNMA, stating that mortgage bankers were reluctant to make urban mortgage loans because they believed "*Fannie Mae won't buy them*" (The Washington Post (6/8/1977)). She also criticized her own department during its previous tenure under Republican administrations for failing to exercise statutory authority over Fannie's operations (The Washington Post (6/8/1977)). Ire was also growing on Capital

Hill. At a February 1978 hearing of the Senate Committee on Banking, Housing, and Urban Affairs, Chairman William Proxmire lambasted that "*FNMA's charter is entirely clear that it has public responsibilities including the support of low- and moderate-Income housing... It is the Committee's impression that, in the case of FNMA, this public oversight function has been neglected by HUD, leaving this massive corporation to conduct its affairs in any manner it sees fit*" (43 FR 36200). Beyond neglecting distributional concerns, Fannie was also criticized for ignoring its role in stabilizing mortgage credit across the financial cycle; since Fannie's privatization in 1968, its portfolio had only rapidly expanded, without any significant volume of mortgage sales despite the 1970s real estate boom-bust cycle.

On several occasions in early 1978, HUD delayed approvals of Fannie's borrowing authority—previously a routine matter—until the last moment.[30] In March 1978, HUD proposed new rules expanding regulatory powers and imposing tighter restrictions on Fannie, including a much more stringent approval process for individual debt issuance and a ceiling on short-term discount notes. After strong pushback from Fannie and the mortgage and real estate industries, HUD issued a weaker final regulation without short-term debt limits, but nonetheless exerting greater approval authority over Fannie's issues of obligations and securities (43 FR 36200).[31] The maximum debt-to-capital ratio of 25-to-1 was also written into the regulations. HUD established housing goals for low- and moderate-income housing and for housing located in central cities, with each goal set at 30% of FNMA's total mortgage purchases (coined the '30/30' goals).[32] Statutory authority for such targets had been set by the Housing and

[30]For example, see The Washington Post (2/11/1978).

[31]The Secondary Mortgage Market Enhancement Act of 1984 (Pub. L. 98-440) substantially curtailed HUD's approval authority over Fannie as codified by this ruling (see below).

[32]The new regulations also required Fannie to file an annual Business Activities Report, in large part based on the annual reporting requirements of the Securities and Exchange Commission, but Fannie remained exempt from SEC filings.

Urban Development Act of 1968, but had not previously been exercised. Fannie objected to the mandatory credit allocations on several grounds, notably that they ignored the FNMA Charter Act's statutory requirement to promote a "*reasonable economic return*" for the association. According to various reports, the 30/30 goals were never consistently monitored or enforced prior to Congress establishing affordable housing goals in 1992, and HUD collected insufficient mortgage data to monitor compliance with the goals (GAO (1996), p. 82). HUD established a Fannie oversight unit after the issuance of these regulations, but it was disbanded shortly thereafter by the incoming Reagan administration. Because the 1978 HUD regulations do not appear to have materially influenced Fannie's purchase activity, we do not consider them a significant policy change.

Housing and Community Development Amendments of 1979 (Pub. L. 96-153)
Enacted: December 21, 1979

The Act increased the S&L Section 5(c) mortgage loan limits from $60,000 to $75,000. On January 3, 1980, Fannie and Freddie announced a new conforming limit of 125% of this amount, or $93,750, up from $75,000 on single unit mortgages (The Washington Post (1/4/1980)). The Act also increased the FHA Section 203(b) loan limit for single-family homes from $60,000 to $67,750. In explaining the increase in the FHA 203(b) limit, the committee report accompanying the Senate bill noted that the median sales price of homes had jumped roughly 30% since the loan limits had last been increased by the Housing and Community Development Act of 1977 (see above), and that the FHA's market share had dropped from roughly 15% to 5% because loan limits had not kept up with inflation or the market (Senate Committee on Banking, Housing and Urban Affairs (1979), p. 14). Regarding the 5(c) limit, the report similarly ex-

plained that "*[b]ecause home prices have escalated 20 to 25 percent in the past 2 year, the committee believes that the $60,000 limit has become obsolete and is severely restricting the ability of thrifts to meet the borrowing amounts requested by today's home buying public*" and that increasing that limit to $75,000 was an adjustment to "*reflect inflation in home prices (and increase in mortgage size) since last amended in 1977*" (Senate Committee on Banking, Housing and Urban Affairs (1979), p. 20).

Committee reports, however, did not cite a benchmark year for which purchasing power would be restored. Assuming the Act would restore purchasing power when limits were last adjusted in 1977 and applying the same methodology as in quantifying the impacts of the Housing and Community Development Acts of 1974 and 1977 (see above) implies no increase in net purchasing capacity from the increase in loan limits.[33] Hence we do not consider this a binding, significant policy change for Fannie Mae. The Act's loan limit increase, however, represented a smaller relative increase for Fannie and Freddie than the prior two increases, and the legislation did not carve out additional increases for the Enterprises, unlike the prior legislative increase in loan limits.[34]

Housing and Community Development Act of 1980 (Pub. L. 96-399)

Enacted: October 8, 1980

The Monetary Control Act of 1980 (Pub. L. 96-221, enacted March 31, 1980) eliminated the S&L Section 5(c) loan limit. Because conforming loan limits for FNMA and FHLMC were set at 125% of the 5(c) limit, that Act also inadvertently eliminated loan limits for the GSEs. The Housing and Community Devel-

[33] Applying a comparable methodology to Fannie's retained portfolio as opposed to purchases also suggests the policy change was not alleviating a binding constraint.

[34] The Act increased conforming loan limits by 25%, versus 66.7% and 36.4%, respectively, in the prior two increases.

opment Act of 1980 quickly restored conforming loan limits and established a formula for automatic annual adjustments. The limit for a mortgage on a single-family unit was reinstated at $93,750 for 1980, unchanged from the lapsed value based on the 5(c) loan limit, while higher limits were introduced for multifamily units. Beginning in 1981, annual upward adjustments were to be made, effective January 1, equal to the year-to-October percentage change in the national average single-family home price for new and existing units from the FHLBB's survey of major lenders. The legislative history does not identify any rationale for the formula, which was not subject to much scrutiny before enactment; there was no public discussion in the House or Senate committees of jurisdiction regarding the new limits or adjustment formula (HUD (1987) p. 37).

On December 23, 1980, Fannie and Freddie announced that, based on the new adjustment formula, the single-family loan limit would be increased to $98,500 on January 1, 1981. According to *Dow Jones Newswire*, "*Fannie Mae said it was adjusting loan amounts upwards to keep pace with rising home prices*" (Dow Jones News Service (12/23/1980)). FNMA also announced that the higher loan limit would be applied to all conventional mortgages with at least a 5% downpayment, whereas low downpayment loans were previously subject to a lower $75,000 ceiling (The American Banker (12/29/1980)). The reinstatement of the $93,750 loan limit was a continuation of current policy, and we do not consider subsequent changes based on the home price indexation formula to be significant policy changes, because they would have been both a continuation of current policy and easily anticipated. As the latter action was taken administratively by Fannie, we do not consider it a policy change.

Of particularly lasting consequence, the Act set in motion the creation of

Fannie's MBS program by mandating that if Fannie submitted a MBS program for approval to the HUD Secretary or Treasury Secretary, their agency would have to either approve said program within 90 days or transmit to Congress a report explaining why it was rejected (CBO (1983)). Through fees for issuing commitments and guaranteeing timely payment, a program packaging and selling MBS to third parties was seen as a way to generate revenue while reducing the association's interest rate risk—a considerable prevailing concern given the Fed's policy stance. As off-balance sheet obligations, MBS were also excluded from capital requirements, making them an attractive source of revenue growth. In July 1981, Fannie announced that it would soon be launching an MBS program, with the first securities to be on the market by year's end. Fannie CEO Maxwell believed the program had "*the potential to attract billions of dollars from pension funds and other investors*," and explained that the program would behave similarly to Ginnie's MBS program, but for the conventional market, which was four-fold the FHA/VA market being served by GNMA (The Bond Buyer (7/29/1981)).[35]

Authorization for Fannie Mae to issue MBS was approved by HUD on September 23, 1981 (HUD (1996), p. 52). The first Fannie-guaranteed MBS were issued in December 1981, in the amount of roughly $700 million, and the program expanded rapidly thereafter. By the end of 1981, Fannie had committed to issue $3.3 billion in MBS (FNMA Annual Report 1981, p. 2) and in

[35]In an October publication in *The American Banker*, Maxwell elaborated on these themes: "*We predict the FNMA-guaranteed mortgage-backed security will do for conventional home lending what Ginnie Maes have done for government-backed loans. Ginnie Maes have achieved a volume of $120 billion, yet the FHA market they serve is a fraction of the size of the conventional market to be served by the FNMA security. The potential for housing is enormous, and so is the potential flow of fee income to FNMA. Because of their FNMA guarantee, their attractive yields, and their simplicity, our new securities will appeal strongly to both mortgage lenders and investors. We believe they will attract new funds into housing. To that end, we have worked closely with managers of major pension funds in designing our security. We will issue our first securities in November*" (The American Banker (10/26/1981)).

1982, the program's first full year of operation, issuance jumped to $13.8 billion (HUD (1987), p. 78–79). Whereas mortgage sales were limited between 1968 and 1981, Fannie's new leadership decided to sell larger quantities of higher yielding mortgage assets through the new MBS program. Around $2.9 billion of the $13.8 MBS issuance in 1982 resulted from sales of its own portfolio, leaving roughly 79% of the total issuance securitized from new purchases. We were unable to quantify or find ex ante projections of Fannie's associated purchase or securitization volume in the first year or two of operations, so we do not treat Fannie's entrance into mortgage securitization as a significant policy change affecting portfolio size. While the new MBS program hoped to attract billions of dollars into conventional mortgage financing, the appetite of investors to hold conventional MBS seemed somewhat uncertain relative to the thriving Ginnie Mae secondary market. If it could be quantified, however, it would have been classified as cyclically motivated.[36]

The Housing and Community Development Act of 1980 additionally authorized Fannie to deal in loans secured by manufactured housing, subject to HUD approval. The last regulatory hurdle was cleared by a FHLBB ruling on July 28, 1981 clarifying that, regardless of ambiguities in state laws, mortgages on manufactured housing were considered real estate loans. In August 1981, Fannie announced that it would launch a nationwide program buying mortgages on manufactured housing (The Washington Post (8/15/1981)). We were unable to quantify or find an estimate of Fannie Mae's likely purchases of manufactured home mortgages, so we do not consider this a significant policy change.

Adjustable-Rate Mortgage Program

[36]The request for MBS program approval was made in an environment of heightened interest rate risk and depressed earnings due to monetary tightening, and HUD's approval was granted early during the recession from July 1981 through November 1982.

Announced: June 25, 1981

Policy Change:	ARM Program Approval
Agency:	FNMA
Impact:	+$0.4 billion
News:	June 1981
Effective:	Aug. 1981
Classification:	Cyclical

On June 25, 1981, Fannie announced it would initiate a purchase program for eight types of variable-rate mortgages, with purchases to start on August 7, 1981 (The Washington Post (6/26/1981)). A Fannie spokesperson announced that commitments would first be made in late July, and that FNMA was unlikely to set any upward limit for August purchases (The American Banker (6/26/1981)). Adjustable-rate mortgages (ARMs) had first been authorized in primary markets earlier in 1981, as the FHLBB, Office of the Comptroller of the Currency (OCC), and National Credit Union Administration (NCUA) approved various programs and lifted interest rate restrictions imposed on federally chartered banks and thrifts (45 FR 1425, 45 FR 79494, 46 FR 18932).[37] FHLBB approval of thrifts issuing adjustable-rate loan issuance on April 23, 1981 also paved the way for Freddie to purchase ARMs from FHLBank members (46 FR 24148, see also FHLMC, Sec. 3.4.2). Without established secondary market support, however, mortgagees were initially hesitant to issue ARMs, and there was little issuance until Fannie and Freddie unveiled their guidelines for adjustable-rate secondary market purchase programs. Because secondary market entry into ARMs was de facto set in motion immediately following deregulation of

[37]The Office of the Comptroller of the Currency ruling allowed an annual rate adjustment of up to 2 percentage points, and the FHLBB rules removed interest rate caps on variable-rate mortgages (HUD (1987), p. 135).

the primary mortgage market and was necessary for mortgagees to issue ARMs, we consider entry into ARMs by Fannie and Freddie as driven by US federal housing credit policy regulatory changes.

Upon Fannie's announcement, *The American Banker* reported that its program would be "*substantially broader than the purchase plan recently put together by the Federal Home Loan Mortgage Corp*" (The American Banker (6/26/1981)). Four of Fannie's announced ARM products were negative amortization mortgages, which Freddie's program had not included at the time. Furthermore, industry analysts "*had said at the time the FHLMC plan was announced in late May that many lenders would likely postpone plans to sell ARMs until FNMA's program was disclosed*" (The American Banker (6/26/1981)). No estimate could be found for the volume of FNMA's pending ARM purchase program and independently quantifying such an impact is constrained by uncertainty and related regulatory changes for the primary market, but there were public projections of Freddie's pending ARM purchase program, unveiled just one month earlier. Given the expectation of a larger ARM program for Fannie, we adopt the high-end estimate of FHLMC's ARM program, for an annualized impact of $400 million in the program's first year of operations.[38]

After Freddie and Fannie announced their ARM programs in May and June, respectively, thrifts rapidly began originating ARMs in the summer of 1981, but initially tended to prefer holding them in portfolio—to reduce their own interest rate risk exposure—rather than selling to the secondary market (HUD (1987), pp. 135–136). But by the end of 1981, Fannie had made commitments to buy more the $1 billion in ARMs (FNMA Annual Report 1981, p. 2). During the

[38]FHLMC President Brinkerhoff had projected that Freddie would purchase $500 to $600 million worth of ARMs in the first 18 months of program operations, or up to $400 million on an annualized basis (see ARM Program under FHLMC, Sec. 3.4.2)

first full year of the program in 1982, Fannie's purchases totaled $3.2 billion (HUD (1987), p. 71), and FNMA's purchase volume of ARMs subsequently rose steadily. In 1984 and 1985, ARMs constituted over one-third of its retained portfolio purchases, reaching $7.1 billion in 1985, and about 20% of its MBS issuance. The share of ARMs in Fannie's retained portfolio increased from 5% in 1982 to about 18% in 1985 (HUD (1987), p. 71, Treasury (1990), p. A-32).[39]

On June 23, FNMA's chief economist leaked that Fannie would unveil its program on June 25, and additionally confirmed that multiple loan types would be purchased—including negative amortization loans. Market analysts reported that the program would be more expansive and flexible than FHLMC's ARM program (The American Banker (6/24/1981)). Breaking from a streak of falling prices and predominantly negative excess stock returns, Fannie's share price rose 2.5% on the June 23, a gain of 1.4 percentage points over the S&P 500 for the day. Shares flatlined on June 25 when the program was formally announced, slightly behind a 0.1% gain for the S&P 500. No earlier concrete news of a pending ARM program could be found being priced into shares. Consequently, we date the news of Fannie's pending ARM program being made public to June 23, 1981.

The program expansion into ARMs was made in an environment of heightened interest rate risk and depressed earnings resulting from monetary tightening, and the program took effect early in the recession lasting from July 1981 through November 1982 and in the midst of the credit crunch persisting from 1978Q2 through 1981Q4. Primary market deregulation was explicitly driven by economic conditions; for instance, the introduction of the FHLBB's proposed

[39]Because of declining interest rates, ARM purchases dropped sharply to 4% of total purchases in 1986.

rule for allowing renegotiable-rate mortgage instruments cited that the Board was "*monitoring the **money market situation***" and that "*recent credit tightening policies of the Federal Reserve have resulted in **extremely volatile interest rates**, causing growing reluctance of discretionary mortgage lenders to make long-term loan commitments, and a resulting **scarcity of home mortgage funds***" (45 FR 1425). Moreover, the ARM program was explicitly intended to help revitalize Fannie's balance sheet by reducing interest rate risk and increasing revenue in light of Fannie's ongoing financial difficulties; HUD estimated that Fannie had a negative net worth of $7 billion in 1980 and $10 billion in 1981, and FNMA's program was intended to enhance profits (HUD (1987), p. 100). Consequently we classify the ARM program's approval and launch as cyclically motivated.

Second Mortgage Purchase Program

Announced: September 10, 1981

Policy Change:	Second Mortgage Program Approval
Agency:	FNMA
Impact:	+$5.0 billion
News:	Sep. 1981
Effective:	Nov. 1981
Classification:	Cyclical

In June 1981, Fannie appealed to HUD for approval of a second mortgage purchase program aimed at increasing the yield on its portfolio as well as lowering second mortgage costs. Because of high prevailing interest rates, many homebuyers were increasingly relying on second mortgages for home purchases, and Fannie argued it could help provide liquidity for this financing instrument. In 1980, between $15 billion and $20 billion worth of home equity

loans were made nationwide, up from $3 billion to $4 billion in the mid-1970s (The Washington Post (8/8/1981)). Second mortgages, or home equity loans, have shorter maturities, and were thus also intended to improve Fannie's maturity match between assets and liabilities.

On July 9, 1981, the HUD Secretary submitted an interim rule, effective August 3, 1981, redefining 'mortgage loan' to allow FNMA to request approval for a second mortgage purchase program (46 FR 39434). The interim rule found that the FNMA Charter Act was consistent with Fannie dealing in secondary mortgages, but that standing HUD regulations defining mortgage loans were a barrier, and needed modification to keep up with the evolving structure of the housing market. The interim rule was atypically accelerated, bypassing the customary initial notice of proposed rule making, subsequent comment period, and 30-day delay in taking effect, as a delay "*could cause unnecessary hardships to homebuyers and sellers who would benefit from the development of a secondary market in second mortgages, and to FNMA in forgoing profitable business transactions.*" The HUD Secretary later issued the interim rule for adoption without amendment on January 20, 1982, to take effect March 18 (47 FR 5410).

Even before final adoption of the interim rule, HUD Secretary Pierce sent a letter on September 10, 1981 approving Fannie's request to purchase second mortgages, citing the need for liquidity as a key motivation. But against Fannie's wishes, HUD only granted explicitly temporary approval, set to expire on March 31, 1983. HUD viewed the program appropriate given the importance of second mortgages for housing finance in the high interest rate environment. But upon an anticipated return to more normal interest rates, HUD regarded the role of second mortgages allowing homeowners to access their home equity for

non-housing purposes as outside of Fannie's statutory purpose (HUD (1987), p. 171). In practice, however, this approval was extended several times and was later made permanent by the Housing and Community Development Act of 1987 (Pub. L. 100-242).[40]

On November 19, 1981, Fannie officially announced that it would begin purchasing second mortgages beginning on November 30 (The American Banker (11/20/1981)). Fannie had recently estimated it could finance up to $5 billion worth of second mortgage loans a year (The Washington Post (8/8/1981)). Based on that projection, we assign a $5 billion annualized increase in Fannie's potential retained portfolio in the year starting September 1981, on the first public news of the program's approval by the HUD Secretary. In practice, second mortgage purchases totaled $176 million in 1981, $1.55 billion in 1982, $1.41 billion in 1983, and $0.94 billion in 1984. There is no direct evidence explaining the reversal in purchase volumes (HUD (1987) p. 71), but the decline in interest rates may have reduced demand for home equity loans, both from homeowners and Fannie.

Shares of Fannie rose 5.4% on July 10, 1981, 5.4 percentage points above the daily return on the S&P 500, when the HUD Secretary's interim rule redefined 'mortgage loan' to accommodate a second mortgage program. Upon approval of Fannie's request on September 10, shares jumped another 5.4%, closing 3.9 percentage points above the S&P 500. No alternative explanations for these excess stock returns could be identified through newspapers or other periodical finance sources.

[40] A June 27, 1983 letter extended authorization through September 30, 1984, and the Secondary Mortgage Market Enhancement Act of 1984 (Pub. L. 98-440) provided temporary statutory authorization, subject to further restrictions on the program (see below).

FNMA's request was made in an environment of heightened interest rate risk and depressed earnings resulting from contractionary monetary policy, and the regulatory ruling was made in the midst of the recession lasting from July 1981 through November 1982. The interim HUD rule was explicitly made "*[i]n view of recent inflation in both costs and interest rates, and* ***given recent demand for second mortgage financing***" (46 FR 39435). That rule also explained that program approval was in part intended to increase Fannie's profitability and improve its balance sheet: "*[s]ince second mortgages usually bear a higher interest rate than first mortgages, dealing in them could prove attractive to FNMA as a method of increasing its portfolio yield on investments*" (46 FR 39435). The regulatory approval process was also unusually fast-tracked, further suggesting that immediate economic concerns were paramount. We thus classify the second mortgage program's approval and launch as cyclically motivated.

HUD Increases Debt-to-Capital Ratio to 30-to-1 (47 FR 58044)

Announced: December 22, 1982

Policy Change:	Increased Debt-to-Capital Ratio
Agency:	FNMA
Impact:	+$6.25 billion
News:	Dec. 1982
Effective:	Dec. 1982
Classification:	Non-Cyclical

A rule proposed by HUD on May 17, 1982 (47 FR 21093) and published unamended on July 22 (47 FR 31866), to take effect September 10, newly permitted the HUD Secretary to increase FNMA's debt-to-capital ratio by expedited means of simply publishing a notice in the federal register, subject to an adequately

justified request by Fannie. The rule had been proposed "*due to the [HUD] Secretary's determination that the interests of neither the public nor FNMA or the purposes of the Charter Act require resort to rulemaking procedures upon FNMA requests for increase in its maximum debt-to-capital ratio, and in order to permit the Secretary to respond to requests for increases in a manner more directly focused on FNMA's immediately foreseeable requirements than would be practicable in rulemaking proceedings*" (47 FR 21094). Fannie's debt-to-capital ratio had risen sharply in 1981, and the association had projected its debt-to-capital ratio would reach the standing 25-to-1 limit by the end of 1982.[41] FNMA had initially appealed to HUD to markedly increase its leverage limit to 35-to-1, "*based in major part upon the length of time inevitably consumed by rulemaking proceedings and a desire to avoid such repetitive proceedings*" (47 FR 21094), a borrowing cushion and implementation lag that HUD's new rule sought to obviate. Following the rule's implementation, Fannie modified its request to 30-to-1 and the HUD Secretary granted the modified request on December 22, 1982, effective immediately, thereby increasing Fannie's cap on secondary market facility borrowing from 25 to 30 times Fannie's capital, surpluses, reserves, and undistributed earnings (47 FR 58044).

Using 1981 year end regulatory capital of $2.5 billion (Department of the Treasury (1990), p. A-82), the HUD Secretary's approval would have implied maximum growth in mortgage assets of $12.5 billion ($2.5 × (30 - 25) = $12.5). Using the two-year rule, we assign a $6.25 billion annualized increase in the year starting December 1982, dated to the HUD Secretary's approval. Shares of Fannie rose 3.6% on December 22, 1982, when the HUD Secretary's rule modification was announced, closing 3.4 percentage points above the daily return

[41] HUD noted that "*[i]ncreases in the [debt-to-capital] ratio during 1981 resulted more from contraction of stockholders' equity (caused by losses due to the negative spread on FNMA's portfolio) than from large increases in total borrowings*," and this dynamic was expected to continue in 1982 (47 FR 21094).

on the S&P 500. No alternative explanation for this daily excess stock return could be identified through newspapers or other periodical finance sources. In practice, Fannie's debt-to-capital ratio rose from 23.2 in 1981 to 25.9 in 1982 and 27.3 in 1983, suggesting that the policy change indeed alleviated an otherwise binding regulatory constraint.[42]

The HUD Secretary's approval stressed that the maximum limit could affect FNMA's borrowing ability, or the "*attractiveness of its securities*," and that the increase was intended to keep Fannie advancing its public mission: "*As FNMA's actual debt-to-capital ratio approaches the limit set by the Secretary, indicating the possibility of an urgent need for an increase in the near future, uncertainty and consequent adverse market reaction could result. The Secretary believes, therefore, that it is both prudent and in the interest of* ***facilitating FNMA's continued ability to meet its statutory purposes*** *that the maximum ratio be maintained at a level which will permit* ***continuation of projected activities*** *without artificial hindrance for the proximately* ***foreseeable future***" (47 FR 58045). That published rule made no mention of cyclical concerns.

Both the request and HUD's eventual approval were, however, a response to Fannie's lingering balance sheet woes following the interest rate increases of 1979–1981 (HUD (1987), p. 95). After posting profits for its first 12 years of operations as a shareholder owned company, Fannie sustained losses of $190 million in 1981 and $105 million in 1982, stemming from a negative interest rate margin and amplified by Fannie's inability to diversify its portfolio away from mortgage assets. By year's end 1982, Fannie's net worth had fallen to $953 million, down 27% over two years, against an asset portfolio of $73.0 billion (De-

[42]Ratios are calculated at year's end based on balance sheet data reported by Treasury (Treasury (1990), pp. A-11, A-82).

partment of the Treasury (1990), p. A-11). Loosening Fannie's debt-to-capital ratio fit into a larger deregulatory effort to help both Fannie and the S&Ls recover, or 'grow their way back to health,' without a direct injection of public capital (Elliot (2013), p. 34). Fannie and its regulators turned their attention to increased fee income, diversification into ARMs and second mortgages (see above), and leveraged purchases of newly originated mortgages bearing higher interest rates (GAO (1985)).[43] Agency status in particular was seen as key to enabling Fannie to grow its way out of its financial difficulties; by increasing its debt-to-capital ratio, HUD allowed Fannie to finance new activity with debt instead of equity, permitting Fannie to increase borrowing at relatively favorable interest rates.

By 1982, increasing Fannie's profitability was also seen as a key intermediate step to fully privatizing the GSEs. The 1982 Report of the President's Commission on Housing concluded that Fannie and Freddie "*should play important roles in the development of markets for conventional mortgage passthrough securities. Federal policy should encourage the operation of FNMA and FHLMC as private corporations that retain limited benefits arising from Congressionally mandated commitments to housing... Eventually, both FNMA and FHLMC should become privately owned corporations with common responsibilities and advantages*" (The President's Commission on Housing (1982), pp. 167–168). The report concluded, however, that a transition period was first needed to address "*FNMA's profit problem*" putting

[43] A number of legislative actions around this time underscore this deregulatory approach. The Mortgage Purchase Amendments of 1981 (Pub. L. 97-110, enacted December 26, 1981) amended the FNMA Charter Act and the FHLMC Act to remove the portfolio limitations on the GSEs' holdings of conventional mortgages over one year old, which were previously limited to 20% of investments. The Garn-St. Germain Depository Institutions Act of 1982 (Pub. L. 97-320, enacted October 15, 1982) largely served to loosen regulations on the S&Ls in an effort to improve their beleaguered balance sheets. To facilitate recapitalization, that Act additionally permitted Fannie to issue preferred stock and made such stock freely transferable. And the Miscellaneous Revenue Act of 1982 (Pub. Law 97-362, enacted October 25, 1982) changed Fannie's net operating loss carryback and carryforward tax rules to improve its balance sheet.

it at a serious competitive disadvantage relative to the recently recapitalized FHLMC, which had significantly less interest rate risk exposure heading into the 1980 and 1981–1982 recessions. The administration wanted to help Fannie return to a "*positive profit position*" before phasing out "*FNMA's* ***Treasury backstop*** *borrowing authority and* ***agency status for its obligations***" (The President's Commission on Housing (1982), p. 168).

FNMA's request was made during the recession lasting from July 1981 through November 1982, and HUD's approval was granted shortly after the recession's end. But following monetary easing in the second half of 1981 and a drop in mortgage rates that fall, the housing market had begun recovering in late 1981, and interest rate risk had considerably abetted by late 1982 (Federal Reserve Bulletin February 1983). Final approval was also made more than seven months after the enabling rule for expedited policy changes was first proposed, in stark contrast to the rapid and explicitly fast-tracked regulatory approval process for Fannie's second mortgage program in 1981 (see above). The request and its approval seemed principally motivated by supporting Fannie's core statutory mission, repairing the cumulative balance sheet damage from 1981–1982, helping to advance the administration's longer-term objective of privatization, and avoiding the possibility of a public capital infusion. Moreover, the HUD Secretary's published rule approving the increase made no mention of cyclical concerns. Consequently, we classify the regulatory ruling as contemporaneously unrelated to the business or credit cycle.

Secondary Mortgage Market Enhancement Act of 1984 (Pub. L. 98-440)
Enacted: October 3, 1984

The Act aimed to remove barriers to the issuance of private-label (i.e., non-

GSE) MBS. The goal was to greatly expand the private sector's role in the growing market for MBS, which was dominated by regulation-favored Fannie and Freddie. The Act, for instance, newly allowed state-regulated pension funds and insurance companies to invest in private-label MBS and removed state and federal limitations on thrift and bank holdings of private-label MBS. The Act additionally introduced several amendments to the FNMA Charter Act, and modified several of HUD's regulatory powers over Fannie (HUD (1987)). The Act eliminated HUD's approval authority over Fannie's issuance of obligations, securities, participations or other instruments, effective October 1, 1985, but maintained HUD's approval authority over stock issues and debt obligations convertible into stock (HUD (1987)).[44] It also required HUD to approve or disallow additional programs within 45 days (60 if it required additional information from Fannie). The Act also statutorily extended FNMA's second mortgage purchase authority, but with a sunset of October 1, 1987. Subordinate mortgages were also limited to 50% of the conforming loan limit and the sum of all liens on a property had to cumulatively adhere to LTV ratios.[45] These changes were perceived as reducing regulatory delays and increasing Fannie's flexibility to respond to market conditions (GAO (1985), p. 104). Finally, the Act forced HUD to meets its requirement to submit an annual report on Fannie to Congress, which did not happen until 1987 (HUD (1987)).

HUD Decreases Debt-to-Capital Ratio to 25-to-1

Announced: April 21, 1987

[44]This short-lived approval authority had been established in HUD's 1978 regulatory rulings (see above).

[45]Second mortgage limits were previously the same as first mortgage limits.

Policy Change:	Decreased Debt-to-Capital Ratio
Agency:	FNMA
Impact:	-$2.7 billion
News:	Apr. 1987
Effective:	Dec. 1987
Classification:	Non-Cyclical

The Tax Reform Act of 1986 (Pub. L. 99-514, enacted October 22, 1986) introduced real estate mortgage investment conduits (REMICs), a new tax-preferred vehicle for structuring pass-through mortgage securities. Congress intended REMICs to provide another source of mortgage funds and expand the volume of mortgage credit. Because of their favorable tax treatment, market analysts predicted that REMICs would eventually become the dominant securitization instrument in secondary mortgage markets.

Fannie quickly announced its intentions to enter the REMIC market, which drew strong opposition from private mortgage lenders concerned that agency status gave FNMA an unfair competitive advantage that could be used to corner the market. HUD approval was not required for Fannie to structure REMICs backed by FHA/VA loans, but was required for REMICs backed by conventional mortgages. On November 17, 1986, HUD issued a complaint to Fannie for its failure to request approval for its proposed REMIC program, most of which would be backed by conventional mortgages. On December 17, Fannie issued its first REMICs, a $500 million sale backed with only FHA/VA mortgages.

On January 21, 1987, Fannie requested HUD's approval for REMICs backed by conventional mortgages (HUD (1987), pp. 175–176). HUD approved limited REMIC issuance backed by conventional mortgages of up to $15 billion

on April 21, with authorization expiring June 30, 1988 (The American Banker (4/23/1987)).[46] HUD's ruling also included a requirement that Fannie Mae work with HUD to develop legislation for fully privatizing the association. The rule also immediately and unexpectedly lowered Fannie Mae's debt-to-capital-ratio from 30-to-1 to 25-to-1, which the HUD Secretary stated would be further reduced to 20-to-1 by December 31, 1988. The financial press interpreted the scheduled December reduction as a definitive constraint, with *The Bond Buyer* characterizing the HUD Secretary as having "*directed Fannie Mae to* ***boost its capital or shrink its balance sheet***" and elaborating that "*[t]he agency will be required to lower its debt-to capital ratio to 25-to-1 from 30-to-1 immediately and to reduce it to 20-to-1 by the end of 1988*" (The Bond Buyer (4/22/1987)).[47]

In an April 21 letter to Fannie's chairman, the HUD Secretary explained that he was concerned Fannie would dominate the REMIC market and was acting in accordance with "*the desire of the administration to* ***move Fannie Mae toward privatization***" (The Wall Street Journal (4/22/1987)). The *Wall Street Journal* similarly framed HUD's policy announcements as intended to rein in Fannie, consistent with the administration's objective of privatization: "*[t]he* ***Reagan administration has long sought to shrink the federally sponsored corporations*** *that operate the secondary mortgage market and to leave as much of the business as*

[46]HUD later eased several of these restrictions on Fannie's REMIC issues on April 20, 1988, allowing issuances of up to $20 billion of REMICs through September 30, 1989. Citing continued fears by thrifts and investment banks that Fannie would unfairly dominate the new REMIC market, HUD refused to give the secondary mortgage market operator the permanent, unlimited issuance authority its officials had sought. Fannie had issued about $4 billion of REMICs at the time, and its executives said the additional $16 billion in authority would be adequate for expected market demand (The Wall Street Journal (4/21/1988)). On October 13, 1988, HUD granted Fannie permanent and unlimited authority to issue REMICs. This unexpected regulatory reversal came as Congress was preparing to circumvent HUD and statutorily grant Fannie such authority. A Fannie official explained that "*[n]o federal agency wants to see its authority upstaged by Congress*" (The Wall Street Journal (10/14/1988)).

[47]*National Mortgage News* similarly characterized the regulatory moves as follows: "*the HUD official ordered an immediate reduction in Fannie Mae's leverage to a debt/equity ratio of 25-to-1 and a further cut to 20-to-1 before the end of 1988*" (National Mortgage News (4/27/1987)).

possible for the private sector" (The Wall Street Journal (4/22/1987)). Fannie CEO David Maxwell suggested that the capital reductions would require balance sheet adjustments, but the agency was willing to comply without a fight in exchange for securing REMIC market entry, stating "*FNMA readily accepts the reductions in debt-to-capital ratio. They are in line with our objective of lowering the company's leverage*" (National Mortgage News (4/27/1987)).

At year's end 1986, the regulatory ratio of unsecured debt-to-capital was 27.7 and regulatory capital was $3.3 billion, the same level as in 1984 and 1985 (Treasury (1990), p. A-82). The decrease in the debt-to-capital ratio therefore suggests an eventual capital shortfall of $1.3 billion ($3.3 $\times(\frac{27.7}{20} - 1)$ = $1.3). Taking into account a $375 million common stock issue in February 1987 and conservatively assuming that 75% of the remaining shortfall would be eliminated by increasing retained earnings or loan loss reserves suggests a reduction in Fannie's $94.17 billion asset portfolio of roughly $4.73 billion ($94.17 $\times(\frac{3.3+0.375+0.75\times(1.3-0.375)}{3.3+1.3} - 1)$ = -$4.73) by the end of 1988. Applying a pro rata annualization, we assign a $2.7 billion decrease in Fannie's portfolio capacity from the reduced debt-to-capital limit, dated to HUD's announcement in April 1987 (-$4.73 $\times\frac{12}{21}$ = -$2.7).[48]

The development of the REMIC market following the Tax Reform Act of 1986 and HUD's subsequent decision to allow REMIC issues by Fannie did not directly affect the supply of MBS, because the GSEs mostly re-securitized outstanding agency MBSs. Instead, the issuance of tax-preferred REMICs backed by Fannie MBS created greater overall demand for MBS (FNMA Information

[48]Corroborating this scoring, *The American Banker* reported that "A Fannie Mae spokesman said the agency's current debt-to-capital-ratio there is 21.7-to-1" (The American Banker (4/23/1987)) following Fannie's common stock issue. Meeting the remaining debt-to-capital shortfall through portfolio reductions alone would require asset sales of $7.38 billion between April and December 1987 ($94.167 \times (\frac{21.7}{20} - 1) = -7.38$), relative to assets at year's end 1986. Our estimated portfolio reduction of $2.7 billion is consistent with this score, making further allowances for capital growth through retained earnings.

Statement March 30, 1992, p. 32). As such, we do not attribute any change in Fannie's purchases resulting from HUD's approval of conventional mortgage REMIC issues.

Both lowering Fannie's debt-to-capital ratio and the coincident, reluctant approval of limited conventional mortgage REMIC issues clearly reflected the Reagan administration's anti-GSE sentiments. Various other concurrent actions of the Reagan administration further underscored their efforts to pressure Fannie and Freddie toward privatization. For instance, the administration had started threatening legislation to permanently limit the GSEs mortgage purchase authority in early 1987. The administration's FY1988 Budget touted that "*[t]he administration is studying ways of privatizing [Fannie Mae and Freddie Mac]... The administration also plans to propose legislation that will limit permanently the maximum amount of a mortgage these Government-sponsored enterprises can purchase. This will limit their continued encroachment on the market served by private firms for as long as these entities enjoy the advantages conferred by their association with the Federal Government*" (The Budget for Fiscal Year 1988, p. 2-48). The Office of Management and Budget (OMB) also proposed that the GSEs' loan limits be frozen at "*the lesser of the new $153,000 ceiling or the 75th percentile of home sales prices for each standard metropolitan statistical area*" (National Mortgage News (1/12/1987)).[49] The administration had also proposed imposing user fees for programs run by Fannie and Freddie.

While the charters of Fannie and Freddie were consistent with issuing REMICs and the Tax Reform Act of 1986 was explicitly supportive of their issuance of REMICs, authority to enter the conventional market was by no means

[49]The conforming loan limit freeze was never implemented, and the limit was subsequently raised to $168,700, a 10.2% increase, based on the adjustment rule introduced by the Housing and Community Development Act of 1980 (see above).

guaranteed, particularly given the Reagan administration's hostility (GAO (1988), pp. 40–41). Both the decision—including the accompanying decrease in the debt-to-capital ratio—and its timing appear somewhat unanticipated; on the news of REMIC authorization, Fannie's share price jumped 4.0% on April 21, 1987, for an excess return of 1.5 percentage points above the S&P 500. Newspaper accounts underscore that perceived profitability from Fannie's entry to the conventional REMIC market clearly exceeded downsides from a lower debt-to-capital ratio.

The conventional mortgage REMIC authorization and decrease in the debt-to-capital ratio were made when the economy was neither in recession nor experiencing a credit crunch. Because shrinking Fannie's leverage ratio was explicitly intended to rein in Fannie and advance the Reagan administration's objective of GSE privatization, we classify the policy change as politically motivated and unrelated to the business cycle.

Housing and Community Development Act of 1987 (Pub. L. 100-242)
Enacted: February 5, 1988

The Act made permanent the authorization for Fannie and Freddie to purchase second mortgages on single-family properties. It also banned imposing any user fees for programs run by Fannie and Freddie, which the Reagan administration had recently proposed as a step towards full privatization (see above). The bill was enacted despite the administration's objections, and thwarted many of its recent efforts to reduce the federal role in housing markets, effectively killing momentum toward GSE privatization for well over a decade. A Treasury official explained that "*[w]e had too many other other problems and we didn't have enough political capital to take on Fannie and Freddie...*" (Hagerty

(2012), p. 73). The administration's focus had pivoted to the collapsing S&L industry and fallout from the Latin American debt crisis. Beyond the GSEs' effective lobbying efforts on Capital Hill, Wall Street and the Mortgage Bankers Association were not keen on the GSEs and primary mortgage markets, respectively, loosing access to cheap funding (Hagerty (2012), pp. 72–73).

Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (Pub. L. 101-73)

Enacted: August 9, 1989

FIRREA primarily served as a major regulatory overhaul of the thrift industry and FHLBS in response to the S&L crisis. It established the Resolution Trust Corporation (RTC) to wind down insolvent thrifts, abolished the FSLIC and transferred S&L deposit insurance to the Federal Deposit Insurance Corporation (FDIC), and moved regulatory oversight of Freddie to HUD from the FHLBB, which was also dissolved. The Act additionally contained several provisions affecting Fannie, most notably by amending its statutory purpose to read as follows:

"*SEC. 301. The Congress hereby declares that the purposes of this title are to establish secondary market facilities for home mortgages, to provide that the operations thereof shall be financed by private capital to the maximum extent feasible, and to authorize such facilities to (1)* ***provide stability*** *in the secondary market for home mortgages; (2) respond appropriately to the private capital market; (3)* ***provide ongoing assistance*** *to the secondary market for home mortgages (including mortgages securing housing for* ***low- and moderate-income families*** *involving a* ***reasonable economic return****) by increasing the liquidity of mortgage investments and improving the distri-*

bution of investment capital available for home mortgage financing; and (4) manage and liquidate federally owned mortgage portfolios in an orderly manner, with a minimum of adverse effect upon the home mortgage market and minimum loss to the Federal Government."

Of particular note, FIRREA modified Fannie's statutory purpose from providing 'supplemental' assistance to the mortgage market with directions to providing 'stability' and 'ongoing assistance' to the secondary mortgage market. These charter revisions charged Fannie with maintaining a continuous presence in the secondary market (Department of the Treasury (1990), p. A-5). The revised statement of purpose also newly expanded Fannie's responsibility to support mortgages for low- and moderate-income families involving a 'reasonable' economic return. Prior language set by the 1954 FNMA Charter Act had more narrowly only promoted "*providing a degree of liquidity*," supporting special assistance programs for certain mortgages, and intervening "*as a means of retarding or stopping a decline in mortgage lending and home building activities which threatens materially the stability of a high level national economy*" (see online appendix).

Freddie Mac, which had previously operated without a statutory statement of purpose, was also rechartered with an identical statutory purpose. An accompanying House committee report elaborated upon the revised role Congress envisioned for Fannie and Freddie: "*A* ***primary purpose is to provide stability in the secondary market for home mortgages including mortgages securing housing for low and moderate income families****. This can be* ***accomplished through both portfolio purchasing and selling activities****, as well as through the securitization of home mortgages. The* ***continuous presence of the FHLMC and FNMA in the secondary market in bad as well as good economic times*** *provides assurances of a*

dependable and substantial funding source for home mortgages. FHLMC and FNMA are also required to respond appropriately to the private capital market. They must take a leading role in developing and marketing new and innovative finance and mortgage products and assure that their products are ***responsive to the changing demands of the capital market****. Lastly, FHLMC and FMNA are responsible for providing ongoing support to the secondary mortgage market. They should increase the liquidity of mortgage investments by refining and improving their securitization and credit enhancement products, as well as developing new products that add to the liquidity of mortgage investments. They should improve the distribution of investment capital available for home mortgage financing by seeking to attract new, in addition to traditional, sources of mortgage investment*" (House Committee on Banking (1989), p. 2). Put differently, FIRREA did not so much as usher in mission creep for Fannie and Freddie, but rather mandated a considerably expanded role for the Enterprises in US mortgage finance.

FIRREA established tougher risk-based capital standards for thrifts, but not for Fannie or Freddie. The Act, however, had the effect of increasing thrifts' demand for agency MBS, since Fannie Mae and Freddie Mac securities received a lower risk weighting than whole loans, encouraging thrifts to swap mortgage holdings for agency MBS (HUD (1996), p. 57). Similarly, the Act increased the FHLBanks' demand for agency MBS, as the FHLBS came under pressure to meet the Act's new assessments on its earnings (Hoffman and Cassell (2010), pp. 55–57).[50]

In bailing out insured deposits at failed thrifts, Congress was forced to recognize that the perceived implicit government guarantee behind Fannie and

[50]New assessments were levied on the FHLBS to fund the RTC's resolution of S&Ls and to affordable housing programs.

Freddie also posed a considerable potential liability for taxpayers (Hagerty (2012), p. 77). But Congress punted such concerns a few years down the line with FIRREA, which simply mandated that Treasury conduct two annual studies analyzing the safety and soundness of the GSEs and granted GAO auditing authority over Fannie's mortgage transactions. Treasury's May 1990 report was particularly critical of Fannie, most notably of its credit stress test model and capital management practices, and spurred Fannie to strengthen its capital base in anticipation of legislation imposing stricter capital requirements (see the discussion of FHEFSSA below).

Cranston-Gonzalez National Affordable Housing Act of 1990
(Pub. L. 101-625)
Enacted: November 28, 1990

The Act expressed the view of Congress that "*every American family be able to afford a decent home in a suitable environment*," and outlined seven objectives and related policies to advance that goal. The Act predominantly affected the FHA, HUD, and state-level Public Housing Agencies, as opposed to the GSEs. But it nonetheless marked a distinct shift in the stance and objectives of US federal housing policy with respect to mortgage finance for low- and moderate-income households that would soon be felt by Fannie and Freddie (see below). Signing the bill into law, President George H.W. Bush declared the Act "*an exciting bipartisan initiative to break down the walls separating low-income people from the American dream of opportunity and homeownership*" (Bush (1990)).

Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (Pub. L. 102-550)

Enacted: October 28, 1992

Policy Change:	Capital Requirements
Agency:	FNMA
Impact:	-$4.25 billion
News:	Mar. 1990
Effective:	Mar. 1990
Classification:	Non-Cyclical
Policy Change:	Affordable Housing Goals
Agency:	FNMA
Impact:	+$1.0 billion
News:	July 1991
Effective:	Jan. 1993
Classification:	Non-Cyclical

Spurred on by general concerns about taxpayer-funded financial bailouts in the aftermath of the S&L crisis and Treasury's reports on the GSEs mandated by FIRREA, the capital adequacy of Fannie and Freddie became a focal point in the early 1990s. The Treasury Secretary's May 1990 report on the GSEs—the first of the two annual studies mandated by FIRREA investigating the risks posed by the GSEs—concluded that Fannie was undercapitalized, though it deliberately refrained from quantifying the degree of the shortfall (Treasury (1990)).[51]

[51]The introduction of the May 1990 Treasury study was clear about the GSEs' special status: "*GSEs are in an unusual position. While other corporations are able to diversify their operations, GSEs are mandated to serve specific credit needs in a single business area, which makes them particularly vulnerable to economic downturns in these areas. Furthermore, the financial risks inherent in institutions of this size pose a greater systemic risk that cannot be completely hedged or eliminated... Some GSEs are among the most thinly capitalized of major US financial entities. Unlike other private sector corporations, GSEs are not subject to the usual market-imposed disciplines of increased cost or reduced access to capital as their balance sheet leverage increases beyond normally prudent levels. This is due to the market's perception of a unique and special relationship to the Federal Government. Market participants believe that, if a GSE experiences extreme financial difficulties, Congress would step in to ensure that debt holders*

In particular, the report concluded that existing capital regulations—principally HUD's leverage ratio—were inadequate because of the exclusion of outstanding MBS, which were still held off balance sheet; in a counterfactual application of bank and thrift capital standards, the 1990 Treasury report found that Fannie did not come close to meeting capital requirements for banks and thrifts (Treasury (1990), p. A-73). The final April 1991 Treasury report and a May 1991 GAO report both called for tougher regulatory oversight of the housing GSEs (GAO (1991)).[52] With support from the White House, Congress subsequently began drafting legislation establishing a new regulator as an independent arm of HUD, to be charged with developing new risk-based capital standards for the GSEs, among other roles.

On October 28, 1992, President George H.W. Bush signed into law the Housing and Community Development Act of 1992 (Pub. L. 102-550). Title XIII of the Act, named the Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA), established the Office of Federal Housing Enterprise Oversight within HUD as the new regulator of Fannie and Freddie. Lobbying efforts by Fannie to weaken the legislation were, however, widely considered successful. In anticipation of the Senate vote's on the Act, the *New York Times* commented that the proposed bill "*satisfies Fannie Mae and Freddie Mac but does not go nearly far enough to appease their critics, who contend that the two investor-owned companies enjoy an implicit Federal guarantee on loans that could someday cost taxpayers billions of dollars if defaults soared on mortgages... Drafted in response to fears of a future burden on taxpayers, the bill has been so watered down that Fannie Mae and*

and investors in GSE-guaranteed securities would experience no losses" (Treasury (1990), pp. 7–8).

[52]On the other hand, an April 1991 report by CBO, ordered by the Omnibus Budget Reconciliation Act of 1990 (Pub. L. 101-508), concluded that Fannie and Freddie were "*reasonably well capitalized relative to, and pose a low level of risk of loss to the government from, their exposure to credit risk and interest rate risk*" (CBO (1991), p. xviii).

Freddie Mac are in the slightly odd position of lobbying for a bill to impose regulations on them" (The New York Times (6/30/1992)). Compared to the federal regulators of banks and thrifts, OFHEO was structurally weak and had few legal enforcement powers (FCIC (2011), p. 40, Hagerty (2012), pp. 91–93). The new regulator had little flexibility to adjust capital requirements and was dependent upon Congress for its annual budget request, rather than charging the entities it regulated for related costs, as was the case for all other regulators. The Act also rescinded the requirement of HUD approval for all issues of stock and securities convertible into stock, unless Fannie or Freddie failed to meet their capital standards.

One of the main provisions of the Act affecting Fannie was the introduction of new statutory capital requirements and the mandate that OFHEO develop risk-based capital standards based on stress tests. Addressing Treasury's concern about the Enterprises' unfunded off-balance sheet MBS liabilities, a statutory 'minimum capital' requirement was set at the greater of 2.5% of aggregate on-balance sheet assets or 0.45% of the unpaid principal balance (UPB) on outstanding MBS and equivalent off-balance sheet instruments. OFHEO was to determine what off-balance sheet assets had a similar credit risk as MBS and would thus be subject to the 0.45% minimum capital requirement. The minimum capital requirements were scheduled to take effect on April 28, 1994, preceded by an 18-month transition period with slightly less stringent minimum capital requirements of 2.25% and 0.4%, respectively, assessed upon on-balance sheet assets and off-balance sheet instruments. If capital fell below the minimum level, the OFHEO Director could limit increases in obligations and growth in assets. The Act also established a 'critical capital' requirement of 1.25% of aggregate on-balance sheet assets and 0.25% of the UPB on outstanding MBS and

equivalent off-balance sheet instruments; if core capital fell below these thresholds, Fannie would be classified as critically undercapitalized and required to be placed in conservatorship. Finally, the Act mandated that OFHEO devise supplemental 'risk-based capital' standards that could be more stringent than the statutory requirements. The risk-based capital requirement was to be set at 130% of the amount necessary to withstand ten years of severe credit stress, with the extra 30% designed to protect against managerial and operational risk.[53]

Apart from the capital regulations, the 1992 Act also imposed new affordable housing requirements and expanded HUD's authority to set affordable housing goals. As mission regulator, the HUD Secretary was required to set three classes of housing goals for: 1) low- and moderate-income housing; 2) housing in central cities, rural areas, and other underserved areas; and 3) special affordable housing for low- and very low-income families.[54] During a two-year transition period following its enactment, the Act set interim targets for each of the first two goals equal to 30% of the total number of units financed. The HUD Secretary was additionally required to establish a separate annual interim goal for the two-year transition period, and was authorized to set annual goals thereafter. The amounts under the first two goals were essentially the same as the 30/30 percentage goals that had been previously established for Fannie Mae under HUD's 1978 regulations (see above). Under the additional special affordable housing goal, Fannie was obliged to cumulatively purchase an additional $2 billion of mortgages financing housing for low- and very-low income families during the two-year transition period in 1993 and 1994. Annualizing, we assign a $1 billion portfolio increase to take effect in January 1993 as a result of

[53]Final regulations regarding the risk-based capital standards were not issued until September 2001 (see below).

[54]The Act defined 'low income' as not in excess of 80% of median income in their local area and 'moderate income' as not in excess of median income.

affordable housing goals.

The Act also revised Fannie's statutory purpose to read as follows:

"*SEC. 301. The Congress hereby declares that the purposes of this title are to establish secondary market facilities for residential mortgages, to provide that the operations thereof shall be financed by private capital to the maximum extent feasible, and to authorize such facilities to "(1) provide stability in the secondary market for residential mortgages; "(2) respond appropriately to the private capital market; "(3) provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income families involving a reasonable economic return that may be less than the return earned on other activities) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for residential mortgage financing; (4) promote access to mortgage credit throughout the Nation (including central cities, rural areas, and underserved areas) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for residential mortgage financing; and (5) manage and liquidate federally owned mortgage portfolios in an orderly manner, with a minimum of adverse effect upon the residential mortgage market and minimum loss to the Federal Government.*"

Freddie's statutory purpose saw identical amendments. Of particular note, FHEFSSA amended the statement of purpose for Fannie and Freddie to compel them to accept "*a reasonable economic return that may be less than the return earned on other activities*" in promoting affordable housing. This clause indicated that, in exchange for the special privileges afforded by their unique public charters, profit maximization might have to take a back seat to meeting affordable housing goals. The revision of 'home mortgages' to 'residential mortgages' was also

indicative of a broader push to promote affordable homeownership via multi-family and condominium residences. The explicit emphasis added regarding supporting "*central cities, rural areas, and underserved areas*" was a clear nod to redirecting or sustaining mortgage credit toward historically underserved communities.

The Act additionally mandated a number of studies on the effect of fully privatizing the Enterprises, to be drafted by the Comptroller General of the United States, HUD, Treasury, and CBO.

It is quite clear that FIRREA and the ensuing release of Treasury's first report on the GSEs, published May 31, 1990, raised red flags with Fannie's management about tougher pending capital regulations and triggered preemptive action to increase its capitalization. In an effort to supersede Treasury's first report, Fannie hired former Federal Reserve Chairman Paul Volcker to assess its capitalization. Volcker's report, published March 6, 1990, stated that if Fannie followed its own proposed capital adequacy standards "*the Company would be in a position to maintain its solvency in the face of difficulties in the housing markets and an interest rate environment significantly mores adverse than any experienced in the post-World War II period*" and risks of a public bailout "*would be remote*" (Hagerty (2012), p. 76–77).[55] To meet those standards, Fannie Mae concurrently announced that it would increase its capital stock to roughly $6 billion by the end of 1991, up from $3.7 billion in early 1990, a goal it repeatedly claimed was easily feasible (Barron's (5/21/1990)). Hagerty (2012) characterized Volcker's report as "*an audacious maneuver—perhaps [Fannie's] most brilliant lobbying coup ever*," as it had the effect easing pressure from Congress to increase FNMA's

[55]Fannie's proposed capital standards were "*nonrecourse credit risk at a ratio of 135-to-1, recourse and collateralized credit risk at 250-to-1, interest-rate risk on on-balance-sheet mortgages at 50-to-1, and credit and interest-rate risk of other on-balance-sheet assets at 50-to-1*" (Barron's (5/21/1990)).

capitalization. Irrespectively, HUD announced in mid-March that it was ramping up oversight of Fannie and Freddie, appointing six HUD executives to a new oversight board focusing on the Enterprises' "*credit risk, interest rate risk, and capital adequacy*" (The American Banker (3/16/1990)). HUD Deputy Secretary Alfred DelliBovi said the housing agency would postpone a ruling on capital adequacy until the first round of Treasury and GAO reports were completed. A market analyst's report published for Bernstein Research on May 10, 1990 discussed and largely dismissed concerns about capital adequacy impeding earnings per share ahead of the GAO and Treasury reports (Gray (1990)). The research note projected that Fannie would accumulate $2.7 billion in capital over the two years to December 1991—roughly in line with Fannie's pledged increase in capitalization accompanying the Volcker report—with $2 billion from retained earnings net of dividends, $500 million from the expiration of warrants in the spring of 1991, and another $250 million from net reserve additions.

Fannie consistently surpassed its regulatory requirements after the minimum capital thresholds were enacted in 1992 (OFHEO (1998)). In a 1998 report, OFHEO concluded both that Fannie did not meet the 1992 capital requirements before mid-1990 and that Fannie began boosting capital ratios around the time of the May 1990 Treasury report in anticipation of legislative action (OFHEO (1998)). Assessing the impact on asset growth associated with the anticipation of the new requirements is inherently difficult. To arrive at an estimate, we assume perfect foresight about the eventual 1992 regulations. Using the transitional minimum capital requirements under the 1992 Act, OFHEO retroactively estimated a counterfactual capital deficiency in 1989 of 40% of the transitional minimum requirement (OFHEO (1998)). Based on year end 1989 core capital of $3.4 billion, the implied shortfall would have been $2.3 billion ($3.4 $\times(\frac{1}{0.6} - 1)$

= \$2.3) at the end of 1989—in line with Fannie's recapitalization plan. FNMA added \$500 million in common stock in 1991 through the exercise of outstanding warrants. Assuming 75% of the remaining shortfall was achieved through retained earnings and reserve additions by year end 1991, the residual implied reduction from its \$107 billion in mortgage holdings would be roughly \$8.5 billion (\$107 $\times(\frac{3.4+0.5+0.75\times(2.3-0.5)}{3.4+2.3} - 1)$ = \$8.5). Using the two-year rule, we assign an annualized \$4.25 billion decrease in Fannie's retained portfolio starting in March 1990, based on expectations of new capital regulations, dated to the Volcker report and Fannie's recapitalization plan.

Identifying the proper timing for the news of expected capital regulations is difficult, but it is clear that Fannie was anticipating more stringent capital requirements and actively increasing its capitalization by March 1990 to May 1990. Fannie's share price rose 2.5% on the news of the Volcker report and preemptive capitalization plan on March 6, 1990, a gain of 1.2 percentage points above the S&P 500 for the day. Shares fell 0.7%, for a negative excess return of 1.8 percentage points below the S&P 500, on March 16, the day *The American Banker* reported that HUD was ramping up regulatory oversight of Fannie, particularly with respect to regulatory capital. There was less stock price movement surrounding the release of the Treasury report in late May. We identify March 1990 as the month that anticipated regulatory capital increases were priced in and began to be acted upon.

The special affordable housing goals enacted in October 1992 and made effective in January 1993 had also long been anticipated, having been backed by both Fannie and Freddie in July 1991 (National Mortgage News (9/23/1991)). The original version of the House-originated Government-Sponsored Enter-

prises Financial Safety and Soundness Act of 1991 (102 H.R. 2900), introduced July 16, 1991, would have required that Fannie and Freddie develop affordable housing programs (AHPs) funded at no less than 20% of the previous year's dividends payments, with no provision for a lower transitional requirement.[56] Starkly opposed to efforts to amend the bill to instead divert 10% of the Enterprises' annual net earnings to affordable housing—similar to FIRREA's assessment on the FHLBanks—the GSEs were instructed by the House Financial Services Committee to negotiate a mutually agreeable AHP framework with a number of housing advocacy groups. After weekend negotiations over July 27–28, 1991, Fannie and Freddie promised to purchase $3.5 billion in low-income single- and multifamily housing loans over 1992–1993 (Congressional Quarterly Weekly Report (8/3/1991)). On July 30, that $3.5 billion AHP commitment was incorporated in a leadership amendment during subcommittee markup (Dow Jones News Service (7/30/1991)). In response to the introduction and early evolution of the GSE oversight bill, Fannie's common shares fell 2.0% on July 16, 1991, for a negative excess return of 1.8 percentage points below the S&P 500 for the day, a skid that extended through the next day of trading. This movement reversed course around the subcommittee markup, with Fannie's shares rising 1.4% on July 30 and 3.8% on July 31, for excess returns of 0.4 percentage points and 3.5 percentage points, respectively.[57]

The final version of H.R. 2900, referred to the Senate Committee on Banking, Housing, and Urban Affairs on September 30, 1991, contained affordable housing goals of $2 billion and $1.5 billion, respectively, for Fannie and Fred-

[56] According to *The Washington Post*, dividends paid in 1990 would have implied affordable housing funding of $34.6 million from Fannie and $19.4 million for Freddie (The Washington Post (7/27/1991)).

[57] We could not discern whether adoption of the leaders' amendment occurred before or after the closing bell on July 30, 1991.

die during a two-year transition period starting January 1, 1992, followed by a minimum of 1% of purchases in subsequent years. The bill also included the sense of Congress that the GSEs had "*an affirmative obligation to promote affordable housing for low- and moderate-income families, consistent with the corporation's overall mission*" and required both to develop their own affordable housing goals. When introduced on May 15, 1992, the Federal Housing Enterprises Regulatory Reform Act of 1992 (110 S. 2733) also included the $2 billion and $1.5 billion special affordable housing goals, with the transition period delayed to cover 1993–1994. The accompanying Senate committee report argued that the GSEs were not doing enough to improve homeownership for disadvantaged populations and noted that "*many parties contend that the standardizing and dominant influence of the GSEs has actually hurt the ability of lower-income and non-suburban borrowers to obtain mortgage loans.*" (Senate Committee on Banking, Housing and Urban Affairs (1992), pp. 28–29). Roughly coinciding with the Senate bill being reported on May 15, Fannie announced on May 13 a new 'House America' partnership with mortgage originator Countrywide Financial, promising to provide $1.25 billion worth of mortgage financing for low- and moderate-income families over the next 18 months (Reuters (5/14/1992)), in line with the enacted $2 billion transition period goal for 1993–1994. Using the two-year rule, we assign an impact of $1 billion to Fannie's affordable housing goals for 1993, but date the news of this policy change to the July 1991 negotiations, rendering the policy as anticipated well in advance of taking effect.

The Senate committee report accompanying FHEFFSA stated that the main motive was to "*improve the regulation of government sponsored enterprises,*" and identified FIRREA's mandated studies as the origin of the legislation, further underscoring that the Act was the result of a long and deliberative process (Sen-

ate Committee on Banking, Housing and Urban Affairs (1992), pp. 1, 6). The Senate report made no mention of economic stabilization or the current state of the economy as a motivation for either policy change. In his statement upon signing the Housing and Community Development Act of 1992, President Bush emphasized an array of policy changes entirely unrelated to the business cycle, touting that the bill "*establishes a sound regulatory structure for Government-sponsored enterprises (GSEs), combats money laundering, provides essential regulatory relief to financial institutions, authorizes several key Administration housing initiatives, and reduces the risk of lead-based paint poisoning*" (Bush (1992)). The only mention of improving economic performance was related to "*reducing the regulatory burden*" on the banking system.

The bill was enacted during the tail end of the credit crunch persisting from 1990Q1 through 1992Q4. But single-family housing starts and total residential investment rebounded throughout 1992, spurred by a combination of low interest rates, unseasonably warm weather early in the year, and tax reasons (Annual Report of the Federal Reserve Board 1992, pp. 21, 50–51, 75). Mortgage rates had fallen to their lowest levels since the 1970s. Multifamily housing starts continued to drop throughout the year, but the decline was largely attributed to an excess supply of vacant units and depressed rents. Given the forward-looking nature of the bill, its gradual development starting with FIRREA and oversight reports in 1990, political motives related to avoiding a future taxpayer bailout of the GSEs, and that the economy and housing markets had recovered well before the bill's enactment, we classify the Act as unrelated to the business or financial cycle.

HUD Interim Notices on Housing Goals

Issued: October 13, 1993; November 30, 1994

On July 22, 1993, HUD proposed interim affordable housing goals and provided Fannie and Freddie with an opportunity to review and comment. Fannie stated that it would be 'hard-pressed' to meet the low-income lending targets, signaling that the company would take a confrontational stance against HUD's tough line on the lending targets and performance monitoring (The American Banker (8/12/1993)). On October 13, 1993, HUD issued interim housing goals for 1993–1994 that were only slightly revised in response to comments received. The interim goals were not mandatory, but carried a lot of weight in the politically charged environment in which the GSEs were operating (The American Banker (10/14/1993)). For Fannie, the goals with respect to low- and moderate-income housing remained at 30% of total purchases for 1993 and 1994. For housing located in underserved areas, the goals were set at 28% and 30% for 1993 and 1994, respectively. The special assistance goal remained $2 billion for the 1993–1994 period. For both years, only purchases exceeding the level of business activity supporting households targeted by this goal in 1992 would count toward meeting the $2 billion interim goal.[58] On a current policy basis, HUD's interim notices did not necessitate any change from the $2 billion statutory interim housing goal for increased mortgages purchases over 1993 and 1994, as required by FHEFSSA (see above).

On November 30, 1994, HUD temporarily extended the modified housing goals into 1995. The goals were to apply on a pro-rated basis until permanent goals were established later in the year (see below). The annualized goal for

[58]Fannie Mae estimated that it purchased $7.2 billion of mortgages in 1992 that would have qualified toward the special assistance goal, had it applied. Fannie's 1993–1994 special assistance goal was then established as twice the 1992 baseline ($14.4 billion) plus the $2 billion interim goal, for a two-year goal of $16.4 billion (58 FR 53048).

special assistance purchases for Fannie Mae was lowered to $4.6 billion in 1995, calculated as half the 1992 baseline plus $1 billion (59 FR 61504). The special assistance goal baseline was lowered out of recognition that the dollar volume of conventional mortgages originated in 1995 was projected to be substantially lower than that originated in 1992. The reduced goal for 1995 was therefore entirely due to changes in mortgage market conditions rather than policy objectives, and thus we do not consider it a significant policy event.

National Homeownership Strategy

Released: May 2, 1995

On November 5, 1994, President Clinton called for a national drive to increase the homeownership rate, which had started declining in 1980 and, despite increases in the preceding two years, remained well below its historical peak. He directed HUD to form a partnership with leaders in the housing industry, non-profits, and every level of government to develop a national homeownership strategy. In May 1995, HUD released a report, *The National Homeownership Strategy: Partners in the American Dream*, outlining a detailed plan to add as many as eight million new families to the homeownership rolls by 2000. This goal translated to targeting a national homeownership rate of 67.5%, relative to 64% in 1994. The strategy recommended a series of concerted actions to help middle- and low-income families, racial and ethnic minorities, families with children, and young adults overcome barriers to homeownership (HUD (1995)). Fannie and Freddie were among the national partners in developing and implementing this strategy, and the report approvingly noted some recent relaxations in the agencies' underwriting standards, as well as their efforts to develop automatic underwriting software starting in 1994. The Clinton admin-

istration had already been increasing its emphasis on combating discrimination in home mortgage lending, and the Enterprises were coming under more public relations pressure to increase purchases of mortgages for minorities and lower-income families. In particular, a Boston Fed study first circulated in 1992, later published in the *American Economic Review* (Munnell et al. (1996)), had recently documented evidence of systematic discrimination in mortgage lending, based on early data collected as a result of the Home Mortgage Disclosure Act (HMDA) of 1975 (Pub. L. 94-200, enacted December 31, 1975); the paper reverberated throughout the industry and with the GSEs.

HUD Final Rule on Housing Goals

Issued: December 1, 1995

In November 1994, HUD temporarily extended the 1994 housing goals for Fannie Mae and Freddie Mac into 1995 (see above), but also drafted more stringent permanent housing goals for subsequent years, which were submitted to OMB for review (The American Banker (12/2/1994)). It was reported that the drafted rules would increase the required share of mortgage purchases meeting the low- and moderate-income goal from 30% to 44% by 1998. The new goals for 1996–1999 were formally issued on December 1, 1995. The low- and moderate-income goal was raised from 30% to 40% of the total number of dwelling units financed by mortgage purchases for 1996, and to 42% for 1997–1999. The underserved areas goal was lowered from 30% to 21% of the total number of units for 1996, and to 24% for 1997–1999. The special assistance goal was set at 12% of the total number of units for 1996, and at 14% for 1997–1999. The final rule also included additional subgoals for multifamily mortgages. HUD also announced it would establish annual goals for 2000 and beyond, but pending their issuance,

the annual goals for subsequent years would be the same as those for 1997–1999 (60 FR 61846).

Fannie and Freddie had increased their holdings of mortgages for low-income borrowers and underserved areas over 1992–1995. HUD reported that it designed the final goals for the program's early years to be attainable under more adverse conditions than prevailed at the time, but noted that goals would likely become binding constraints as economic conditions changed (Treasury (1996), p. 54). Studies by HUD (1996) and Treasury (1996) concluded that Fannie's 1995 performance already exceeded all of the new goals that became effective in 1996. A 1998 GAO report later stated that "*[a]vailable evidence from HUD's final housing goal rule indicates that the HUD Secretary generally adopted a conservative approach to setting the final goals in December 1995 for the period 1996 through 1999. This conservative approach placed a high priority on maintaining the enterprises' financial soundness. For example, in 1994 and 1995, HUD and OFHEO conducted research which found that additional mortgage purchases required under the goals were modest and would not materially affect the enterprises' financial condition*" (GAO (1998), p. 8). Based on this evidence, we conclude that the higher goals issued for 1996–1999 did not induce significant changes in Fannie's purchase volume or composition, and thus we do not consider the new housing goals a binding, significant policy change.

OFHEO Ruling on Off-Balance Sheet Assets

Proposed: June 8, 1995

The Housing and Community Development Act of 1992 granted OFHEO moderate discretion in determining what off-balance sheet assets had a similar credit risk profile as MBS and would thus also be subject to the 0.45% minimum

statutory capital ratio for off-balance sheet assets. OFHEO determined that interest rate and foreign exchange contracts posed a greater risk than MBS, meriting greater capital adequacy ratios. A rule proposed on June 8, 1995 would have required higher capital ratios of 3.0% of the credit equivalent amount of uncollateralized interest rate and foreign exchange rate contracts and 1.5% of the credit equivalent amount of collateralized contracts (60 FR 30201). OFHEO published a final rule setting those higher minimum capital requirements on July 8, 1996 (61 FR 35607). An OFHEO official stated that the ruling "*in no way implies any significant increase in their capital standards*" and *National Mortgage News* reported that "*it appears the two government-sponsored enterprises already are in compliance*" (National Mortgage News (7/15/1996)). Accordingly, we do not consider the rule a binding, significant policy change.

New HUD Regulations on Housing Goals

Published: October 31, 2000

Policy Change:	Affordable Housing Goals
Agency:	FNMA
Impact:	+$24.4 billion
News:	July 1999
Effective:	Jan. 2001
Classification:	Non-Cyclical

Affordable housing goals came up for renewal in 1999, and HUD had the choice of leaving them unchanged, lowering them, or raising them. On July 29, 1999, HUD Secretary Andrew Cuomo announced a policy of large increases in the goals for 2000–2004, stating that such action would address the nation's housing needs, strengthen the economy, create jobs through home construction,

and transform the lives of millions of families (HUD (1999)). The low- and moderate-income goals for Fannie and Freddie would have been increased from 42% to 48% in 2000 and 50% for 2001–2003, requiring the two GSEs to purchase an estimated $488.3 billion in additional affordable housing mortgages over the next decade. A proposed rule reflecting this policy was formally issued by HUD on March 2, 2000 (65 FR 12632).

The final rule, which largely resembled the proposed rule, was issued on October 31, 2000, to take effect January 1, 2001 (65 FR 65044). The low- and moderate-income goal was raised from 42% to 50%, the underserved areas goal was increased from 24% to 31%, and the special assistance goal was raised from 14% to 20% (all as in the proposed rule). The one-year transition period at a lower 48% target for the low- and moderate-income goal was, however, dropped. Absent from the proposed rule, the final rule additionally adopted recommendations from a June 2000 report by HUD and Treasury on predatory lending, with the rule adding more stringent rules and lending guidelines to disallow high-cost loans with predatory mortgage lending features from counting toward the AHP goals (HUD (2000)).

HUD's final policy announcement again stated that under the higher goals, Fannie Mae and Freddie Mac would buy an additional $488.3 billion in mortgages that would provide affordable housing for 7 million more low- and moderate-income families over the next decade. Those new mortgages and families were above and beyond the $1.9 trillion in mortgages for 21.1 million families that would have been purchased if HUD's standing goals had been retained (HUD (1999)). Assigning half of the increased volume to Fannie and dividing equally over ten years yields additional purchases of $24.4 billion annually, as

announced in July 1999, and to take effect January 1, 2001.

The purchase behavior of Fannie and Freddie was somewhat influenced by the affordable housing goals issued in 2000, although the Financial Crisis Inquiry Commission report noted that "*until HUD set new affordable housing goals for 2005, the GSEs only supplemented their routine purchases with a small volume of loans and non-GSE mortgage-backed securities needed to meet their requirements*" (FCIC (2011), p. 185). The elevated affordable housing goals became more difficult to meet during the refinance boom of the early 2000s, though it was later estimated that the net cost of meeting the goals was close to negligible through 2004 for both Fannie and Freddie; while "targeted affordable" loans purchased just to meet the AHP goals had higher expected default rates and charge offs, they also generated greater fee income (FCIC (2011), p. 186). Profitable expansion of multifamily portfolio purchases also helped meet the goals without hurting the GSEs' bottom line, particularly for Freddie Mac.

Financial markets appeared to react to new information revealed with both the proposed rule and final rule publication, gradually pricing in the higher affordable housing goals and suggesting that they had been anticipated well ahead of taking effect. News of the proposed rule leaked on July 28, 1999, after HUD announced a scheduled press conference with Secretary Cuomo and Fannie Mae Chairman Franklin Raines the following day.[59] Fannie's share price slid -1.0% on July 28, for a negative excess return of -1.2 percentage points below the S&P 500. When the proposed rule was detailed on March 2, 2000, Fannie's

[59]Dow Jones News Service reported: "*HUD plans to raise the level of commitment pledged by Fannie and Freddie to repurchasing home loans initiated by low- and moderate-income families to 48% next year from the current 42% level, according to people familiar with the matter. In addition, the new standards are set to jump to 50% in 2002, the sources said. The new level raises the bar significantly for Fannie and Freddie, though analysts said the higher commitment to such loans is not expected to have a detrimental impact on their operations*" (Dow Jones News Wire (7/28/1999)).

stock price fell 1.8%, for a negative excess return of -2.0 percentage points below the S&P 500. Fannie's share price fell 3.1% upon the announcement of the more aggressive final rule on October 31, 2000, for a negative excess return of 5.3 percentage points below the return on the S&P 500.

Shortly after HUD had published its proposed rules, Fannie announced a new 'The American Dream Commitment' on March 15, 2000, which was intended to fund $2 trillion in mortgages for 18 million households over the next decade in order to "*close homeownership gaps, strengthen communities and stabilize neighborhoods, and fight discrimination and unfair practices in the mortgage marketplace*" (FNMA Annual Report 2000, p. 41). Coinciding with the final rule's issuance, Fannie unveiled a new 'My Community Mortgage' pilot program on October 31 for low- and moderate-income borrowers, pledging to purchase $2 billion in loans with higher LTVs and lower down payments than usual as well as $500 million in mortgages for two- to four-family unit buildings. The roll-out of both programs are again suggestive that the ruling had been long anticipated. Given financial markets' gradual pricing of the policy change and the overwhelming similarities between HUD's initial and final rules, we date the news of this policy change to the July 1999 unveiling of the proposed rule, rendering the policy anticipated well in advance of taking effect in January 2001.

While HUD Secretary Cuomo's July 1999 remarks noted that the rule would be good for the economy, the emphasis was clearly placed on expanding homeownership opportunities, particularly for minority communities: "*This action will transform the lives of millions of families across our country by giving them new opportunities to buy homes or move into apartments with rents they can afford... It will strengthen our economy and create jobs by stimulating more home construction,*

it will ***help ease the terrible shortage of affordable housing plaguing far too many communities****, and it will help reduce the huge* ***homeownership gap*** *dividing whites from minorities and suburbs from cities*" (HUD (1999)). HUD's press release noted that the policy changes would "*disproportionately* ***benefit minorities and city residents, helping to close the homeownership gap***" and "*help ease the crisis-level* ***shortage of affordable housing*** *documented by a HUD report issued in March*" (HUD (1999)). Moreover, President Bill Clinton's remarks on HUD's action underscored that the increase in the goals was part of a long-standing policy initiative to increase homeownership and affordable housing, making no mention of cyclical or economic concerns.[60] HUD's final rule emphasized the GSEs' public responsibility for promoting homeownership for underserved populations and combating predatory lending but made no mention of cyclical concerns, noting instead that the "*mortgage market remained strong*" (65 FR 65051). Fannie Mae's Annual Reports for 1999 and 2000 similarly both stressed the association's positive role in expanding access to affordable housing and closing homeownership gaps in relation to the HUD goals, without mentioning any cyclical concerns about housing or mortgage markets. The Annual Report of the Federal Reserve for 1999 described a "*strong housing market*," noting that "*[n]early all the indicators of housing activity showed upbeat results for the year*," particularly new and existing home sales, both of which hit record highs (Annual Report of the Federal Reserve Board 1999, p. 8). The development of the rules had also been set in motion long ago by the Housing and Community Development Act of 1992 and precedent from previous HUD housing goals. Consequently, we classify

[60]President Clinton's prepared remarks were as follows: "*During the last six and a half years, my Administration has put tremendous emphasis on promoting homeowners and making housing more affordable for all Americans. Our housing programs and institutions have been a success. Today, the homeownership rate is at an all-time high, with more than 66 percent of all American families owning their homes. Today, we take another significant step. Raising the GSEs goals will help us generate increased momentum in addressing the nation's housing needs. I congratulate HUD Secretary Andrew Cuomo and the entire HUD team on their efforts in this important area*" (HUD (1999)).

the increase in affordable housing goals as non-cyclically motivated.

OFHEO Ruling on Capital Requirements Issued: September 13, 2001

OFHEO's development of risk-based capital standards for Fannie and Freddie, pursuant to FHEFSSA, was a slow process. On June 10, 1996, OFHEO published a first notice of proposed rule making outlining the risk-based capital 'stress test' being developed, identifying a proposed methodology for calculating the 'benchmark loss experience' to be used for determining the GSEs' likely credit losses (61 FR 29592). In September, OFHEO stated that Fannie Mae and Freddie Mac would probably be required to hold more capital than they currently had on hand, in order to withstand severe economic disturbances (National Mortgage News (9/23/1996)). In June 1997, Fannie boasted that, to the contrary, it would have a $1.5 billion surplus over required capital if OFHEO's proposed risk-based capital rule had been in effect (National Mortgage News (6/2/1997)).

But reports surfaced in March 1999 that Fannie was actively lobbying for 'substantive changes' in the proposed risk-based capital rule under review by OMB (The American Banker (3/2/1999)). The *Washington Post* reported that FNMA would have needed an additional $3.5 billion as of September 30, 1996 to meet the $16.55 billion cushion that would have been required under the proposed rules, and an additional $3.68 billion to meet the $17.73 billion that would have been required if the rules had been in effect on June 30, 1997 (The Washington Post (3/27/1999)). Despite these projected shortfalls, Fannie's shares jumped 6.5%, for a gain of 7.1 percentage points above the daily return on the S&P 500, when they were reported in conjunction with news of the final rule clearing OMB; markets reacted positively to OFHEO's statement that "*relatively*

inexpensive hedging strategies can dramatically reduce required capital," while Fannie spokesman John Buckley touted success in Fannie's lobbying efforts, claiming "*the OMB review process was helpful in improving the rule*" (Dow Jones News Service (3/26/1999)). Following the fierce behind-the-scenes efforts by Fannie Mae officials to substantially alter the rule, OFHEO officially issued a second proposal fleshing out the rest of the stress test on April 13, 1999 (64 FR 18084).

On December 19, 2000, OFHEO announced that the risk-based capital rule had been completed and was again under review by OMB (The American Banker (12/19/2000)). The final rule was made public in July 2001 and published in the Federal Register on September 13, 2001 (66 FR 47730), but enforcement was delayed for one year, until September 13, 2002—a full decade after the Housing and Community Development Act of 1992 mandated the rule's development. The final risk-based capital standard subjected the GSEs to a severe national economic shock that was assumed to last for ten years, required the GSEs to maintain sufficient capital to withstand the shock, and required additional capital for management and operations risk. An evaluation of the stress test by Stiglitz, Orszag, and Orszag (2002) concluded that if Fannie Mae and Freddie Mac could meet the standard, their risk of insolvency was conservatively one in 500,000, though that test might fail to reflect a Great Depression-type scenario.

The risk-based capital requirements were consistently and considerably lower than the statutory minimum capital requirements that had already been imposed by FHEFSSA (Frame, Gerardi, and Willen (2015)), so we do not consider their imposition to be a binding, significant policy change. In practice, Fannie Mae and Freddie Mac both maintained capital well in excess of the regulatory risk-based capital standard until mid-2008 (Frame, Gerardi, and Willen

(2015)).

SEC Disclosure Requirements

Announced: July 12, 2002

In response to growing fears that the expansion of Fannie and Freddie posed a systemic risk to the economy, a bill was introduced in Congress to curtail the GSEs' privileges and tighten their regulatory oversight. The GSEs' private competitors had been particularly displeased with Fannie's budding expansion into the profitable subprime mortgage market. After HUD released a study in early 2000 reporting that Fannie Mae was discriminating against African Americans, the attack from business lobbies and Congress was joined by the Clinton administration. In a March 2000 statement before the House Financial Services Committee, a Treasury official stated that the Treasury Department supported removing Fannie's statutory lending backstop. Fannie took a confrontational approach while ramping up its formidable lobbying efforts.[61] In October 2000, Fannie announced a number of voluntary initiatives to appease their critics (see above), but anti-GSE sentiment continued to build, spurred on by the change in administrations in January 2001. The George W. Bush administration's FY2003 Budget, published in February 2002, contained an unusual amount of detail on the risks posed by Fannie and Freddie, citing concerns about the growth of their debt outstanding and market perceptions of a government guarantee (The Washington Post (2/6/2002)).

The Enron accounting scandals, which broke into national headlines in October 2001, started tipping the tide of public sentiment against the Enterprises.

[61] Testifying before Congress, Fannie's CEO combatively fired back that "*there is a school of thought that if you harass Fannie Mae, maybe they'll pull their punches... but anybody who knows me knows that would be a very large tactical error. Anyone who thinks that trying to intimidate us would be productive would be making a mistake*" (The American Banker (1/31/2001)).

A bill was introduced in March 2002 that would have revoked the exemptions for Fannie and Freddie from SEC disclosure requirements (The New York Times (7/12/2002)). On April 1, 2002, Fannie and Freddie volunteered new and more in-depth disclosures about their use of derivatives and other risk management practices (The American Banker (4/2/2002)). But following charges of inadequate disclosures, OFHEO announced on April 9 that it was launching a comprehensive review of the companies' financial statements, with assistance from the SEC (The American Banker (4/9/2002)). In an effort to preempt legislative action and fiercer regulatory oversight, Fannie and Freddie 'voluntarily' agreed on July 12, 2002 to register their common stock with the SEC and comply with SEC disclosure requirements, including filing audited 10-K annual reports, 10-Q quarterly reports, and 8-Ks (Pitt (2002)). While the agreement was entered voluntarily, it could not be revoked without SEC approval.

New HUD Regulations on Housing Goals

Issued: November 1, 2004

Policy Change:	Affordable Housing Goals
Agency:	FNMA
Impact:	+$7.6 billion
News:	Apr. 2004
Effective:	Jan. 2005
Classification:	Non-Cyclical

The GSEs' affordable housing goals again came up for renewal in 2004, the first time under the Bush administration. On April 5, 2004, HUD sent Congress proposed aggressive new rules that would have raised the low- and moderate-income goal from 50% in 2004 to 58% by 2008, the underserved goal from 31% to

40% in 2008, and the special assistance goal from 20% to 28% in 2008. In an effort to boost support for first-time homeowners, HUD additionally proposed a new quota that 45% of the single-family, owner-occupied mortgages purchased by Fannie and Freddie in 2005 had to qualify for the low- and moderate-income goal, to be raised to 47% by 2007. A HUD spokesperson said the proposed housing goals would not be made public until the 15-day Congressional review process was complete, but the targets had been reported by *The American Banker* on April 7 (The American Banker (4/7/2004)).

On November 1, 2004, HUD announced the final rule for housing goals for 2005–2008, which were slightly scaled back from those proposed in April (The Wall Street Journal (11/1/2004)). Unlike the previous goals, the new rules provided for increases in the goals for every year between 2005 and 2008.[62] The stated purpose of the elevated goals, according to HUD Secretary Jackson, was to "*help the GSEs achieve the standard that Congress intended–leading the mortgage finance industry in helping low- and moderate-income families afford decent housing*" (HUD (2004)).

HUD projected that to meet the new housing goals, Fannie and Freddie together would have to purchase an additional 400,000 goal-qualifying home loans during the four-year period 2005-2008, above what they would purchase without the increase in the housing goals (HUD (2004)). The average unpaid principal balance on goal-qualifying mortgages acquired by Fannie in 2003 was $152,000 (HUD (2008), Table 14a-2003). This estimate suggests a four-year cumulative additional purchase volume of $60.8 billion ($152,000 × 400,000 = $61

[62]The low- and moderate-income goal was raised to 52% in 2005, 53% for 2006, 55% for 2007, and 56% for 2008 (American Banker (11/2/2004)). The underserved areas goal was raised to 37% in 2005, 38% for 2006 and 2007, and 39% for 2008. The special assistance goal was raised to 22% in 2005, 23% for 2006, 25% for 2007, and 27% for 2008 (69 FR 63581).

billion). We apportion half this amount to Fannie and divided equally over four years, for an annualized increase in purchases of $7.6 billion resulting from the increase in affordable housing goals for 2005–2008.

When the proposed goals were leaked in early April, Fannie's shares fell 1.3% on April 6, 2004, closing 1.1 percentage points below the S&P 500 for the day. Fannie's stock price rose 0.4% on November 1 and 1.5% on November 2 on leaked news of the final rule and its publication in the Federal Register, respectively, closing 0.4 percentage points and 1.4 percentage points above the S&P 500 those days. The final rule's one percentage point reduction across the three goals, relative to the proposed rule, was received positively, although the response to shares may have been muted by speculation about the imminent presidential election.[63] Given the similarity of the final rule to the proposed rule, and markets' initial pricing of the more aggressive rules, we date the news of the housing goals being made public to the April 2004 leak of the proposed rules.

The new affordable housing goals appeared to have noticeably affected both Fannie's purchase behavior and bottom line. According to the Final Report of the Financial Crisis Inquiry Commission, HUD's affordable housing goals predominantly resulted in supplementing routine purchases with small purchases prior to 2004 (see above), but the goals for 2005 onward were considerably more difficult to meet and risked considerably greater carrying losses (FCIC (2011), pp. 186–187). Fannie expanded several initiatives purchasing targeted loans, including its My Community Mortgage program, and loans with lower under-

[63]The following day shares fell 3.7%, 4.9 percentage points below the return on the S&P 500, with the skid was attributed to President Bush winning reelection and Republicans gaining in the House and Senate on November 2nd—election outcomes perceived as increasing the odds of GSE reforms and further diminishing the Enterprises' political favor (Reuters (11/3/2004))

writing standards. Targeted goals loan purchases totaled $18 billion in 2006, or 3.4% of FNMA's $524 billion in single-family purchases for the year; these targeted loan purchases were estimated at a holding opportunity cost of $390 million, nearly 10% of FNMA's annual income, and which would rise to roughly $1 billion as the market deteriorated in 2007.

HUD's aggressive affordable housing goal increases fell under a broader policy umbrella of the administration prioritizing expanding affordable home ownership, particularly for minorities. President Bush had emphasized using the GSEs to promote minority homeownership in a June 2002 speech: "*Too many American families, too many minorities do not own a home. There is a* ***home ownership gap*** *in America. The difference between Anglo America and African American and Hispanic home ownership is too big... Fannie May and Freddie Mac, as well as the federal home loan banks, will increase their commitment to* ***minority markets*** *by more than $440 billion... This means they will purchase more loans made by banks to African Americans, Hispanics and other minorities, which will encourage homeownership. Freddie Mac will launch 25 initiatives to eliminate homeownership barriers*" (Bush (2002)). In signing into law the tellingly titled American Dream Downpayment Act of 2003 (Pub. L. 108-186, enacted December 16, 2003), President Bush emphasized that "*[t]his administration will constantly strive to promote an* ***ownership society*** *in America. We want more people owning their own home. It is in our national interest that more people own their own home. After all, if you own your own home, you have a vital stake in the future of our country*" (Bush (2003)).

McLean (2015) also suggested that the Bush administration pushed HUD to increase the Enterprises' housing goals—a politically motivated move "*to make sure Fannie and Freddie understood who was the boss in the relationship*" (McLean

(2015), p. 88)—as part of a coordinated effort to rein in the GSEs, precipitated by investigations into Fannie's books and ensuing accounting scandal (see below). The 2004 Annual Report of the Federal Reserve Board noted that, despite the end of the refinancing boom, "*the **housing market remained robust***" in 2004, with new and existing home sales reaching record highs and housing starts accelerating from already high levels in 2003; the report noted that demand was "*supported by nominal mortgage interest rates that have remained near their lowest levels since the late 1960s*" (Annual Report of the Federal Reserve Board 2004, pp. 7, 11–12). Given the lack of discernible cyclical concerns and the explicit long-term objective of promoting homeownership for low- and moderate-income households enshrined by FHEFSSA—and reaffirmed by HUD Secretary Alphonso Jackson's announcement of the new housing goals—we classify HUD's increased goals for 2005–2008 as motivated by social policy and, to a lesser extent, political concerns, and unrelated to credit cycle concerns amidst the US housing boom.

Accounting Scandal: Capital Shortfall and Surcharge

Agreement: September 27, 2004

Policy Change:	ICapital Surcharge
Agency:	FNMA
Impact:	-$141.4 billion
News:	Sep. 2004
Effective:	Sep. 2004
Classification:	Non-Cyclical

Allegations of accounting irregularities at Freddie Mac surfaced in 2002, and were subsequently confirmed in 2003 both by the company and an OFHEO

investigation (see listing below under FHLMC, Sec. 3.4.2). On July 30, 2003, Fannie's chairman reassured investors at a press conference that its books were clean. Having been embarrassed by Freddie's accounting scandal, OFHEO Director Armando Falcon hired Deloitte to undertake an investigation of Fannie's books, while OFHEO started gathering its own information on Fannie's accounting policies in preparation of a special report (McLean (2015), p. 85).[64] On March 31, 2004, OFHEO announced that the special examination could prompt a restatement of prior period earnings results. OFHEO's preliminary report, released on September 22, 2004, concluded that Fannie had misapplied generally accepted accounting principles (GAAP) regarding accounting of hedges and the amortization of purchase premiums, discounts on loans, securities, and other deferred charges. Among many irregularities, the report stated that Fannie inappropriately deferred $200 million of estimated amortization expenses incurred in 1998, allowing the company to report earnings per share at exactly the minimum level required to trigger the largest possible executive bonuses (OFHEO (2004a)). OFHEO's damning report also spurred the SEC to launch its own investigation into Fannie's accounting practices.

On September 27, 2004, OFHEO and Fannie Mae entered into an agreement requiring FNMA to achieve a capital surplus of 30% above its minimal capital requirement by June 30, 2005, in order to provide coverage for uncertainties regarding Fannie's controls and accounting practices (OFHEO (2004b)). The agreement additionally stipulated that until Fannie reached its targeted capital surplus it had to acquire OFHEO's prior written approval before raising its common stock dividends, calling any preferred stock, paying preferred stock dividends above stated contractual rates, or making any payment to repurchase,

[64]OFHEO had declared Freddie to be financially sound just months before their accounting scandal broke.

redeem, or retire any of its shares (OFHEO (2004b)).

The SEC announced on December 15, 2004 that it concurred with OFHEO's ruling on Fannie's accounting improprieties, meaning that FNMA would have to restate earnings, prompting Fannie's CEO Franklin Raines and CFO Timothy Howard to both step down. On December 21, 2004, OFHEO classified Fannie as 'severely undercapitalized' as of the third quarter of 2004, forcing Fannie to develop and submit a recapitalization plan to OFHEO; the regulator subsequently approved Fannie's capital restoration plan on February 17, 2005. The plan detailed how FNMA would achieve the 30% capital surplus over the minimum capital requirement, coined the 'OFHEO-directed capital requirement,' by a revised target date of September 30, 2005. Fannie Mae would be required to maintain this additional capital buffer until OFHEO's Director determined the requirement should be modified or expire.

OFHEO's report deliberately refrained from quantifying the degree of FNMA's capital shortfall, but the *Wall Street Journal* quickly projected that it implied regulatory capital had likely sunk $4.6 billion below the minimum requirement by the end of 2003 (The Wall Street Journal (9/27/2004)), and Fannie would face a much large recapitalization if required to increase its capital cushion by 30%, as had recently been required of Freddie in lieu of its own agreement with OFHEO (see listing under FHLMC, Sec. 3.4.2). The *Journal* also suggested that Fannie might have to reduce debt and sell some of its $989 billion asset portfolio, likely MBS holdings (The Wall Street Journal (9/27/2004)). On November 15, FNMA announced that being required to restate earnings in accordance with GAAP hedging rules would likely result in cumulative losses of $9 billion—the first concrete estimate of Fannie's balance sheet fallout from the

accounting scandal (American Banker (11/16/2004)).[65] In determining Fannie's capital shortfall, OFHEO's December 21 announcement that Fannie was significantly undercapitalized similarly identified the necessary adjustment to core capital at $9.18 billion as of September 30, 2004 (OFHEO (2004c), p. 2).[66]

OFHEO and FNMA estimated that Fannie's downwardly revised core capital of $28.86 billion fell $2.98 billion under its minimum capital requirement of $31.84 billion as of September 30, 2004 (OFHEO (2004c), p. 2). Adjusting for the 30% required capital surplus implied a total capital shortfall of $12.5 billion as of September 2004, to be eliminated by September 30, 2005 (1.3 $\times$ ($31.84) - $28.86 = $12.5). Fannie Mae issued $5 billion in preferred stock at the end of December 2004, but this was not sufficient for OFHEO to change Fannie's capital classification at year's end 2004 (Mortgage Markets and the Enterprises in 2004, pp. 31–33). Even after the preferred stock issue, the *New York Times* reported that Fannie was estimated to need to raise an additional $7 billion over the next six months, some of which market analysts' expected to come from diverting some of its $2 billion to $3 billion in retained earnings from dividends; analysts also noted that FNMA "*could also sell part of its portfolio holdings to raise additional funds*" (The New York Times (12/30/2004)).

To 'accelerate' rebuilding its capital stock, FNMA announced on January 18, 2005 that it was halving its quarterly dividend from $0.52 per share to $0.26 per share in the first quarter of 2005. The dividend cut would reduce quar-

[65] According to *The American Banker*, Fannie explained that if it had to adjust hedging treatment dating back to the adoption of Financial Accounting Standard 133 in 2001 "*it would have to cumulatively recognize after-tax losses of roughly $13.5 billion on cash flow hedge relationships that have been deferred, and recognize gains of approximately $4.5 billion on fair value hedges*" (American Banker (11/16/2004)).

[66] In line with OFHEO's projection, Fannie later estimated that the disallowed hedge and other accounting practices had reduced core capital by $9.0 billion as of September 30, 2004 (FNMA 10-K Filing Report 2006, p. 19).

terly outlays by $252 million, or $1.0 billion on an annualized basis, as was reported at the time (The New York Times (1/19/2005)). Interim FNMA Chairman Stephen Ashley cast the move as "*a prudent and responsible action to take as the company moves expeditiously to increase its capital*" (The New York Times (1/19/2005)). OFHEO Director Falcon echoed that the dividend cut exemplified Fannie's "*commitment to taking necessary measures to increase the company's capital*," and noted that OFHEO would continue reviewing and authorizing each quarterly dividend payment (The Washington Post (1/19/2005)). The OFHEO-FNMA agreement required OFHEO's approval for any dividend increase relative to the prior quarter, suggesting that FNMA's dividend cut would not last merely one quarter. The dividend cut—Fannie's first since 1981—reportedly "*surprised many on Wall Street*," and was widely interpreted as being forced upon Fannie by OFHEO (The New York Times (1/19/2005)).[67] The financial press generally seemed to suggest that the dividend cut would not be reversed in the near-term, in part because of OFHEO's involvement and discretion over dividends (The Wall Street Journal (1/19/2005)). Ex post, FNMA's dividend would not be raised from $0.26 per share until December 2006 (FNMA 10-K Filing Report 2005, pp. 38, 158).[68]

The company also cancelled plans to build new corporate offices as another measure in Fannie's approved recapitalization effort. Complicating such cost-cutting efforts and the ability to recapitalize through retained earnings, however, were expenses accruing from its multiple ongoing investigations and overhauling its accounting and risk management practices. Fannie later estimated that costs incurred because of the scandal—covering additional lawyers, ac-

[67]The *Wall Street Journal* had noted, however, that "*[s]ome analysts had warned that the company might have to cut its dividend*" (The Wall Street Journal (1/19/2005)).

[68]In practice, FNMA's dividends payments on common and preferred shares fell from $2.19 billion in 2004 to $1.38 billion in 2005 (FNMA 10-K Filing Report 2005, p. F-5).

countants, and fines—totaled $1.6 billion in 2005 and 2006 (Hagerty (2012), p. 140).

Beyond the preferred stock issue, dividend cut, cost-cutting measures, and increased retained earnings, the capital restoration plan also included "*significantly reducing the size of [FNMA's] investment portfolio, through both normal mortgage liquidations and selected sales of mortgage assets, which reduced the amount of assets in the consolidated balance sheets and thereby reduced [FNMA's] overall minimum capital requirements*" (FNMA 10-K Filing Report 2005, p 158). Market analysts had begun suggesting that Fannie would have to reduce its portfolio to meet the capital surcharge almost immediately after it was announced and the gravity of FNMA's capital shortfall began to be realized. The *Washington Post* reported on September 28 that "*[s]everal analysts said Fannie Mae would probably choose to sell assets or reduce growth, in part because selling stock would require the firm to warn investors that its current financial statements are under review and may have to be restated*" (The Washington Post (9/28/2004)). *National Mortgage News* reported in January that Fannie was "*expected to grow more slowly*" as it recapitalized, and that its November loan purchases indeed suggested as much; Fannie's retained portfolio fell 1.7% from October, with purchases down 15% for the month and 30% from the previous year (National Mortgage News (1/17/2005)).

Quantifying the related implications for Fannie's balance sheet is inherently complicated given the sheer magnitude of Fannie's $12.5 billion capital shortfall, short turnaround for its closure, and varying market expectations; the extent to which both dividend cuts and portfolio reductions would be used to rebuild Fannie's capital was the subject of much disagreement. We assume perfect foresight as of the September 27, 2004 OFHEO-FNMA agreement of information

revealed over the next four months, notably the magnitude of Fannie's shortfall, Fannie's preferred stock issue, and dividend cut. We also assume that the September 30, 2005 recapitalization deadline imposed by the OFHEO-directed capital requirement would be a binding constraint. The $5 billion preferred stock issuance reduced Fannie's shortfall to $7.5 billion, of which another $750 million would be filled in the year from September 2004 by dividend cuts, which we assume would be maintained until Fannie was recapitalized. Assuming other cost cutting measures and retained earnings could not have closed more than an additional $1 billion of the shortfall within a year would imply a residual portfolio reduction of up to 13.8% ($\frac{28.86+5+0.75+1}{1.3\times 31.84} - 1 = -13.8\%$) by September 30, 2005. Based on Fannie's $1.03 trillion in assets as of September 30, 2004 (FNMA 10-K Filing Report 2004, p. F-103), this estimate would imply a portfolio reduction of $141.4 billion within one year.[69] We assign this impact to Fannie's retained mortgage portfolio, with its news being made public in September 2004, when OFHEO released its preliminary report and entered the recapitalization agreement with Fannie.

Retrospectively, Fannie's 2005 10-K report emphasized that "*mortgage investment activities during 2005 were conducted within the context of our capital restoration plan... The size of our net mortgage portfolio declined 20% during 2005 to $736.5 billion as of December 31, 2005, due to a significant increase in portfolio sales, normal liquidations and fewer portfolio purchases*" (FNMA 10-K Filing Report 2005, p. 98). The Annual Report of the Federal Reserve Board similarly noted that "*Fannie Mae reduced its mortgage portfolio about 20%*," which "*occurred partly because of* ***regulatory concerns about the adequacy of its capitalization***" (Annual Report of the Federal Reserve Board 2005, p. 27). Fannie's total mortgage portfolio fell

[69] We do not apply the two-year rule here because of the September 2005 deadline for Fannie's recapitalization.

$179.3 billion, or 19.6%, from $917.2 billion at the close of 2004 to $737.9 billion at the end of 2005 (FNMA 10-K Filing Report 2006, p 121). An OFHEO report also noted that Fannie constrained its retained portfolio activities in 2005, both to comply with the capital restoration plan and because addressing its accounting problems limited Fannie's ability to respond to innovations in mortgage markets: "*Fannie Mae, which needed to shrink its assets in order to raise its capital ratios, reduced its retained portfolio purchases to $147 billion in 2005, down 44 percent from 2004*" (Mortgage Markets and the Enterprises in 2005, p. 19). That their lower purchase volume was primarily due to capital deficiencies was further evidenced by the fact that Freddie Mac, during the same year, saw retained portfolio purchases increase 42% to $320.6 billion (Mortgage Markets and the Enterprises in 2005, pp. 19–20).[70]

In May 2005, OFHEO reported that Fannie was "***adequately capitalized***" as of March 31, meaning that its core capital exceeded the minimum capital requirement, and was on track to meet its September 30 deadline for the 30% capital surplus (The Wall Street Journal (5/20/2005)). Fannie's core capital had been increased to $35.0 billion, and its minimum capital requirement had decreased to $30.96 billion, down $880 million since September 30, as a result of portfolio reductions. On November 1, 2005, OFHEO announced that Fannie had indeed succeeded in achieving a 30% surplus over their minimum capital requirement by the September 30, 2005 deadline. Fannie's 2005 10-K cited portfolio reductions as instrumental: "*Lowering our net mortgage portfolio enabled us to achieve our capital objective*" (FNMA 10-K Filing Report 2005, p. 98).

The revelations of September 2004 had certainly not been priced into the

[70]Similarly, Fannie's total purchase volume declined 8% to $558 billion in 2005, whereas Freddie's total purchase volume increased 7% to $393 billion (Mortgage Markets and the Enterprises in 2005, pp. 19–20).

market before that month, but that quickly changed as market analysts and the financial press caught on to the implications for Fannie's core capital and portfolio. The *Wall Street Journal* scooped the most damning of OFHEO's charges against Fannie on September 20, 2004, ahead of a meeting between OFHEO and Fannie executives, reporting "*evidence of a pattern of decisions by executives aimed at manipulating earnings to present a smoother performance*" (The Wall Street Journal (9/20/2004)). According to the *American Banker*, the *Journal's* scoop immediately started adversely affecting Fannie's share price (American Banker (9/21/2004)). Fannie released a summary of OFHEO's findings the morning of Wednesday, September 22, and OFHEO's report was made public after markets closed that afternoon. Fannie's common shares fell throughout the week, for a cumulative drop of 15.1%, with the largest declines of -6.6% and -5.0%, respectively, realized on Wednesday and Thursday (negative excess stock returns of 5.2 and 4.5 percentage points below the S&P 500, respectively). The market reaction to Fannie's classification as severely undercapitalized after markets closed on December 21, 2004 was considerably more muted, suggesting that the fallout from the capital surcharge had largely been priced in already. Shares jumped 2.2% on December 22, 2004, rising 1.9 percentage points above the S&P 500 index, seemingly driven by the concurrent news that Raines and Howard, Fannie's top executives, were being forced out—which investors hoped would staunch the regulatory crackdown.

The Annual Report of the Federal Reserve Board portrayed the housing market as quite healthy but not overheated in 2004 (see 'New HUD Regulations on Housing Goals' above), and we found no evidence that concerns about an overheating housing market contributed to OFHEO's regulatory actions. The backlash of capital surcharges and increased micromanagement of Fannie did,

however, follow a trajectory of increased political opposition to the GSEs by the Bush administration and Federal Reserve, which were advocating shrinking both Fannie and Freddie by either legislative or regulatory means. As part of that coordinated effort, "*Greenspan, with support from the administration, began to testify about the risks the GSEs, particularly their huge portfolios of mortgages, posed to the financial system*" (McLean (2015), p. 86). Greenspan stated in his autobiography that an "*effort that began in 2003 to* ***curb the excesses at Fannie Mae and Freddie Mac***" succeeded in convincing President Bush to back the Fed "*through a two-year struggle that resulted in crucial reforms*" around the time of the accounting scandal (Greenspan (2007), p. 242).[71] McLean (2015) described the accounting scandals and OFHEO's investigation into Fannie as a politically exploited turning point against the Enterprises' lobbying clout: "*what had been sporadic, fairly uncoordinated efforts to* ***rein in the GSEs*** *became a concerted push... The Bush administration made common ground with [OFHEO Director] Falcon and began ramping up a push for* ***stronger regulation of Fannie and Freddie***" (McLean (2015), pp. 85–86).[72] We thus classify the regulatory changes arising from FNMA's accounting scandal capital shortfalls as regulatory backlash to an unforeseen event and being politically motivated to some degree, but certainly unrelated to cyclical or financial concerns.[73]

[71] According to Greenspan: "*The [George W. Bush] administration also took the Fed's advice on policies we thought were essential for the health of the financial markets. Most important was the effort that began in 2003 to curb excesses at Fannie Mae and Freddie Mac, the companies chartered by Congress to help underwrite home mortgages. They are granted a de facto subsidy by financial markets in the form of interest rates with very low credit-risk premiums on their debt—the markets presume Uncle Sam will bail them out in the event of default. Fannie and Freddie had been using this subsidy to pad their profits and grow. But their dealings had begun to distort and endanger the markets and seemed likely to become a bigger and bigger problem. The companies employed skillful lobbyists and had powerful advocates in Congress. President Bush had very little to gain politically by supporting a crackdown. Yet he backed the Fed through a two-year struggle that resulted in crucial reforms*" (Greenspan (2007), p. 242).

[72] Falcon, a Democrat, had been appointed by President Clinton and had previously been more supportive of the GSEs than the Greenspan Fed and parts of the administration. He quickly changed his tune, publicly deriding Fannie as "*a government-sponsored Enron*" (McLean (2015), p. 90).

[73] Ex post, the accounting scandal and regulatory backlash appear somewhat overblown and

OFHEO-SEC-Fannie Settlement: Portfolio Caps

Agreement: May 23, 2006

Against the backdrop of the accounting scandals and OFHEO's continued work on its final report investigating Fannie Mae, the Bush administration and Federal Reserve ratcheted up pressure to limit GSE portfolio growth through legislative or regulatory action (American Banker (2/9/2005)). Testifying before Congress in February and April 2005, Federal Reserve Chairman Alan Greenspan warned that the current size of the mortgage portfolios held by Fannie Mae and Freddie Mac posed a substantial risk to the economy. Greenspan repeatedly proposed limiting each GSE's retained portfolios to somewhere between $100 billion and $200 billion (American Banker (2/18/2005), American Banker (4/7/2005)). In April 2005 testimony before the Senate Committee on Banking, Housing, and Urban Affairs, Treasury Secretary John Snow echoed the administration's view that some type of limit should be placed on the GSEs' retained mortgage portfolios (Department of the Treasury (2005)). In his prepared testimony for Congress, CBO Director Douglas Holtz-Eakin stated that "*[t]he large mortgage portfolios held by Fannie Mae and Freddie Mac are not necessary for the secondary mortgage market to operate efficiently; those enterprises' issuance of mortgage-backed securities (MBS) can accomplish that outcome*" (CBO (2005)). On May 19, the administration delivered a proposal for tighter regulation of Fannie and Freddie that included portfolio limits (The Washington Post (5/20/2005)). Fannie, however, countered that massive reductions in the Enterprises' portfolios could raise mortgage rates or disrupt the housing market in other ways;

perhaps politically exploited to an even greeter degree. The eventual restatement of Fannie's results for 2002–2004 actually resulted in an increase of shareholder's equity of $4.1 billion, the SEC and Justice Departments both eventually dropped their investigations into Fannie's accounting practices, and a civil suit against ousted Fannie CEO Raines was dismissed (McLean (2015), pp. 90–91).

swayed by lobbying efforts, Congress did not pass GSE regulatory reform legislation. In April 2006, Federal Reserve Chairman Ben Bernanke countered that the Treasury Department should consider using its power to curb debt issuances of Fannie and Freddie if regulatory reform of the GSEs was not enacted by Congress (American Banker (4/28/2006)).

OFHEO's final investigative report into FNMA's accounting practices, released May 23, 2006, claimed that Fannie had cumulatively overstated earnings by $10.6 billion, and had improperly smoothed earnings over 1998–2004 in order to increase executive compensation.[74] Concurrent with the report's release, Fannie announced it had agreed to pay a $400 million fine and 'voluntarily' cap its retained portfolio as part of its settlement with OFHEO and the SEC. The accompanying OFHEO consent order retained the 30% capital surplus over Fannie's minimum capital requirement. OFHEO's report explained that FNMA's portfolio should be limited due to "*ongoing internal controls, risk management and accounting deficiencies and the need for the Enterprise to provide OFHEO an acceptable business plan for managing its market activities*" (OFHEO (2006a), p. 1). The consent order capped Fannie's mortgage portfolio assets at their value as of December 31, 2005, calculated as $727.75 billion according to GAAP standards; the portfolio cap was to be maintained until the OFHEO Director determined that modification or expiration of this limitation was merited based on improvements in Fannie's internal controls, accounting practices, and risk management (OFHEO (2006a), p. 6). The GAAP accounting calculation was not an apples-to-apples comparison with Fannie's typical measurement of it portfolio based on UPB; the UPB on Fannie's retained mortgage portfolio totaled $736.5 billion as of December 31, 2005 (FNMA 10-K Filing Report 2005, p. 14). And the UPB on

[74] In December 2006, Fannie Mae released restated financial results for 2002, 2003, and 2004.

Fannie's retained portfolio stood at a lower $721.1 billion as of March 31, 2006, slightly below the cap (Dow Jones Newswires (5/22/2006)). Fannie was given a window of 60 days to propose a plan for improving its business practices and risk management, and such a plan was allowed to propose a "*moderate per annum increase in the 'mortgage portfolio' assets for reasons including liquidity, housing goals, portfolio flexibility, and competitive considerations*" (OFHEO (2006a), p. 6).

Financial markets' reaction to the OFHEO consent order was muted, with Fannie's stock price jumping slightly as analysts interpreted the report as putting an end to the OFHEO inquiry, although the SEC and Justice Department investigations remained ongoing (The New York Times (5/24/2006)). Shares responded positively to details of the report leaked a day in advance on May 22, which accurately reported allegations of deliberate earnings manipulation and recommendations of limiting Fannie's growth and maintaining the 30% capital surcharge (Dow Jones Newswires (5/22/2006)). Fannie's shares rose 0.8% on May 22 and 0.9% on May 23, posting excess stock returns of 1.2 percentage points and 1.3 percentage points, respectively, above the daily performance of the S&P 500. But much of the fallout from Fannie's accounting scandals had already been priced in; the *New York Times* noted that Fannie's stock was down 28% since the disgraced departure of former CEO Raines in December 2004 (The New York Times (5/24/2006)).

This subdued response of Fannie's share price to OFHEO's final report and the portfolio limit's imposition was consistent with the recent trajectory of Fannie's retained portfolio. Fannie's portfolio had fallen from $913.2 billion in September 2004, when OFHEO released its preliminary report on Fannie's accounting practices and FNMA agreed to raise a surplus of 30% above its mini-

mal capital requirement, to $717.3 billion in September 2005, Fannie's deadline for closing its related $12.5 billion capital capital shortfall (see above). While Freddie's portfolio continued to grow rapidly thereafter, Fannie's portfolio roughly flatlined. *Reuters* noted that Fannie's retained mortgage portfolio had grown at an annualized rate of only 0.5% to $721.1 billion in March, dwarfed by an annualized 17.2% growth rate for Freddie's portfolio, which reached $715.4 billion for the month (Reuters (5/23/2006)). Fannie's (not timely) 10-Q report filed on May 9, 2006 had explained that market conditions and credit spreads "*were not sufficient to present significant opportunities to add assets to our portfolio that met our return requirements*" (FNMA NT 10-Q Filing Report May 9, 2006, p. 11).[75] Fannie's first (not timely) 10-Q filing after entering the May 2006 consent agreement again cited market conditions as unfavorable for portfolio growth, but also explained that the agency had not requested an increase in its portfolio cap when submitting a business plan to OFHEO in July because of "*the need to remediate our identified control deficiencies*" (FNMA NT 10-Q Filing Report August 9, 2006, p. 12).[76] Supportive of that view, the *New York Times* quoted an analyst as interpreting OFHEO's report to mean that "*Fannie's fixing of their problems is going to take a lot more money and a lot more time than anyone had an-*

[75]The report elaborated that "*[i]n the first quarter of 2006, competition for mortgage assets remained strong. Nominal and intermittent improvements in spreads were not sufficient to present significant opportunities to add assets to our portfolio that met our return requirements. Portfolio purchases during the first quarter of 2006 were $37.8 billion, compared with $54.9 billion in the fourth quarter of 2005.... The net impact of our liquidations, purchases and sales during the first quarter of 2006 was a less than one percent decline in our portfolio balances, to $721.5 billion at March 31, 2006 from $727.5 billion at December 31, 2005*" (FNMA NT 10-Q Filing Report May 9, 2006, p. 11).

[76]The report specifically explained its decision as follows: "*Based on current market conditions, including strong demand for mortgage assets by other investors, we believe that the rate of liquidations in our mortgage portfolio will provide ample ability for us to support liquidity in the secondary market while maintaining our net mortgage portfolio assets below the limit prescribed in the OFHEO consent order. Given our need to remediate our identified control deficiencies, the business plan we submitted to OFHEO in July 2006, which remains subject to OFHEO's approval, did not request an increase in the current limitation on our mortgage portfolio during 2006. If market conditions change significantly, the portfolio limit could constrain our ability to capitalize fully on economically attractive opportunities to add mortgage assets to our portfolio*" (FNMA NT 10-Q Filing Report August 9, 2006, p. 12).

ticipated," which would continue to impede its business operations (The New York Times (5/24/2006)). In a similar vein, shortly before the cap had been announced Bank of American analysts noted that they "*[did] not expect to see [FNMA's] retained portfolio continue on the growth trajectory that began in the mid-1990s*" (National Mortgage News (5/22/2006)). Regardless of whether Fannie's portfolio growth was previously being restrained by unfavorable market conditions—perhaps hard to believe, given Freddie's steady portfolio growth in the same market—or preoccupation with fixing internal deficiencies and getting out from underneath greater regulatory scrutiny, there does not appear to be a counterfactual retained portfolio growth path that would suggest the portfolio limit was a binding, significant constraint on balance sheet activity.[77]

Reactions in the financial press also generally seemed to suggest that the May 2006 FNMA-OFHEO-SEC agreement was not a binding, significant regulatory constraint. The *American Banker* cited that "*several analysts said they believe OFHEO's cap on the portfolio would only last a few months*" (American Banker (5/24/2006)). *Dow Jones Newswires* quoted Thomas Stanton, a GSE expert, claiming that the "*portfolio limitation appears to be symbolic rather than an effective approach to limiting the company's growth*" (Dow Jones Capital Markets Report (5/23/2006)). The *Financial Times*, on the other hand, quoted a stock analyst projecting the portfolio limit implying a slight reduction in Fannie's holdings on impact, but not beyond: "*Robert Lacoursiere, Bank of America analyst, said that based on April estimates the cap would require Fannie to trim its holdings by about [$3 billion]. But he said the cap would probably not have a major impact on Fannie's performance or its competitive position*" (Financial Times (5/24/2006)). Financial

[77] To the contrary, Freddie had projected that its portfolio would continue to grow in line with the MBS market shortly before OFHEO unexpectedly forced it to adopt a portfolio limit in July 2006, which very much appeared to be a binding, significant constraint on its retained portfolio purchases. See listing under FHLMC, Sec. 3.4.2.

markets' muted response to the regulatory action only seems to underscore that the OFHEO agreement was not seen as an impediment to Fannie's profitability or desired business operations.

Because Fannie's balance sheet had not been appreciably growing in the nine months before the cap's announcement, there was no indication that Fannie imminently planned to grow its balance sheet, Fannie's portfolio stood below the cap, and Fannie could request modest increases in the cap, we do not consider its imposition to have been a binding, significant constraint when announced, which we view as consistent with the reaction of analysts and financial markets.

OFHEO Relaxes Portfolio Caps

Announced: September 19, 2007

Policy Change:	Portfolio Limit Increase
Agency:	FNMA
Impact:	+$17.15 billion
News:	Sep. 2007
Effective:	Sep. 2007
Classification:	Cyclical

Turmoil erupted in the subprime mortgage market in July 2007, and foreclosure concerns spread regarding ARMs and subprime mortgages resetting at higher rates. In early August 2007, several members of Congress called for easing the Enterprises' portfolio restrictions as well as increasing conforming loan limits to address problems fomenting in mortgage markets (American Banker (8/8/2007)).[78] Fannie had requested on August 1 to have its portfolio limit

[78]The House had passed a GSE reform bill in May that would have lifted the conforming loan limit 50% in high-cost areas, but the bill stalled in the Senate and its future seemed uncertain

raised by 10%, but OFHEO rejected the request on August 10, citing lingering concerns about the safety and soundness of the housing GSEs, which had still been unable to issue timely, audited financial statements years after accounting scandals exposed weaknesses in their accounting practices and internal controls (The Washington Post (8/11/2007), FNMA 10-K Filing Report 2006, p. 9). President Bush stated that the portfolio caps on Fannie and Freddie should not be lifted until Congress passed a bill reforming regulation of the GSEs, and Fed Chairman Bernanke asserted that lifting the caps was unnecessary because the GSEs could still support the mortgage market with purchases if they sold some of their MBS holdings to the private secondary market (The Washington Post (8/30/2007)).

After repeatedly urging OFHEO to lift the GSEs' portfolio caps, Senator Chuck Schumer threatened to introduce legislation circumventing the administration to increase the GSEs' portfolios (American Banker (8/17/2007)). In September, a bill was introduced to expand the reach of the GSEs by allowing their mortgage portfolios to grow by 10%, and by raising the conforming loan limit from $417,000 to $625,500. Schumer described the bill as an "***emergency measure***" and both provisions were to be temporary, sunsetting after one year (American Banker (9/11/2007)). The bill was intended to "*infuse $145 billion into the mortgage market*," with half of that amount earmarked for mortgages refinancing ARMs with rates resetting between June 2005 and December 2009.

On September 19, OFHEO announced changes to its methodology for calculating the mortgage portfolio cap in order to provide both Fannie and Freddie greater flexibility in managing market-based fluctuations in an increasingly volatile market. The regulator changed both GSEs' retained portfolio caps from

(American Banker (8/17/2007)).

being measured on a marked-to-market basis, as required by GAAP, to the Enterprises' preferred, less volatile UPB method. OFHEO also adjusted the measurement of retained portfolios from an end-of-quarter basis to a less volatile average of monthly closing values (OFHEO (2007)); the OFHEO press release explained that "*UPB often exceeds the GAAP value for the Enterprises. Due to market fluctuations over the first seven months of 2007, this difference has ranged from $0.1 billion to $9.4 billion*" (Market News International (2007)). The new agreement also loosened Fannie's flat portfolio limit to allow 2% annual growth—not to exceed 0.5% per quarter—from a baseline of $735 billion in UPB at the end of 2007Q3, revised from the previous $727.75 billion portfolio limit based on GAAP measurement. The quarterly growth limit of 0.5% was doubled to 1.0% for the fourth quarter of 2007, to provide even more near-term support for mortgage markets. The binding 2% annual limit would have allowed Fannie a portfolio of up to $749.7 billion in UPB by September 30, 2008. Fannie's Monthly Volume Surveys for August and September 2007 both suggested that their retained portfolio was roughly $4.8 billion as higher measured on a UPB basis rather than a GAAP basis (FNMA Monthly Volume Survey August 2007, p. 2, FNMA Monthly Volume Survey September 2007, p. 2). In scoring the policy change, we add this difference to the prior $727.75 billion portfolio limit based on GAAP as a baseline measured in UPB. Assuming the caps were binding constraints, we assign an annualized increase in Fannie's potential purchases of $17.2 billion in the year starting September 2007 ($\$735 \times 1.02 - (\$727.75+\$4.8) = \$17.2$).

In line with this estimate, the portfolio limit modifications were intended to encourage each of the Enterprises to purchase and/or securitize up to $20 billion each in subprime loans over the next six months, and both GSEs had made

commitments to do so (American Banker (9/20/2007)).[79] The OFHEO press release made it explicitly clear that the policy change was motivated by the subprime crisis and rising foreclosure rates: "*With the **ongoing concerns about the subprime mortgage market**, both Fannie Mae and Freddie Mac have announced commitments to purchase tens of billions of dollars of subprime mortgages over the next several years... These efforts should assist lenders in helping some subprime borrowers avoid foreclosure*" (OFHEO (2007)). While OFHEO motivated the action by the need to add liquidity to the subprime market, the response was viewed by many critics as too little, too late. Fannie's share price rose 2.3% on September 19, a gain 1.7 percentage points above that of the S&P 500 for the day. Fannie executives had still been lobbying for a substantially larger 10% increase in their portfolio limitation (The New York Times (9/20/2007)). Given policymakers' near-term focus on aiding the subprime mortgage market and addressing rising foreclosure rates, we classify the portfolio limit modifications as motivated by financial and credit cycle concerns.

Economic Stimulus Act of 2008 (Pub. L. 110-185)

Enacted: February 13, 2008

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FNMA
Impact:	+$41.57 billion
News:	Feb. 2008
Effective:	Apr. 2008
Classification:	Cyclical

As the housing crisis worsened, several legislative efforts were floated in

[79] Given this short-run emphasis on purchasing $20 billion in subprime MBS, we do not use the two-year rule.

2007 that would have increased the conforming loan limit in high-cost areas. OFHEO warned that such an increase would divert credit from less expensive housing and push the Enterprises deeper into some of the riskiest mortgage markets (The Washington Post (2/8/2008)). As house prices continued to fall, OFHEO announced on November 24, 2007 that conforming loan limits for 2008 would remain at the same levels as in 2006 and 2007 (American Banker (11/28/2007)). By early 2008, the deteriorating economic situation had rapidly become a higher congressional priority than strengthening oversight of the Enterprises. The Economic Stimulus Act of 2008 (ESA), enacted on February 13, 2008, allowed a temporary increase in conforming loan limits for first lien mortgage loans in high-cost areas—dubbed 'super-conforming' loans—originated between July 1, 2007 and December 31, 2008. Effective April 1, 2008, the limit for single-family homes was increased from $417,000 to the higher of that limit or 125% of the area median home price, but not to exceed $729,750 (175% of the previous limit). The increase did not prove fully effective until May 2008, in part because of issues regarding the pooling and trading of the new class of super-conforming mortgages (Vickery and Wright (2013), Fannie Mae MBSenger April 2008, p. 2).

We could not find a direct estimate of the impact of ESA's conforming loan limit change for 2008, so we splice together several estimated impacts. Important to our scoring, the super-conforming loan limit was subsequently reduced from the $729,750 maximum set by ESA to $625,500 for 2009, set in motion by the Housing and Economic Recovery Act of 2008 (HERA), detailed below. Assuming the super-conforming loan limit December 31, 2008 sunset would take effect, we assume the policy to be fully operational from April 2008 through December 2008. An OFHEO document later estimated that, under the high-cost area limits

of up to $625,500, $42.3 billion worth of mortgages would have been additionally eligible for Enterprise purchase for the first half of 2007, or $84.6 billion on an annualized basis (OFHEO Mortgage Market Note 08-1, p. 9). Pro-rating this volume for April through December 2008, we assume the agencies could have purchased $63.45 billion worth of super-conforming loans of between $417,000 and $625,500 in 2008. According to CRS, Fannie and Freddie had securitized 83% of eligible conforming loans in 2006 (CRS (2008), p. 4), and we extend that share to assume that 83% of eligible super-conforming loans would have been purchased by Fannie and Freddie. The FHFA also subsequently reported that the Enterprises acquired approximately $30 billion in mortgages in 2010 with loan balances between the $729,750 ESA limits and the lower $625,500 limit subsequently set by HERA, or roughly 1.77% of the $1.698 trillion total origination volume in 2010 (FHFA Mortgage Market Note 11-01, p. 4).[80] Applying that percentage to 2007 originations of about $2.3 trillion would imply additional purchases of $40.64 billion for all of 2008, or an annualized $30.48 billion for the portion of the year starting April 1, 2008 ($\$2,300 \times \frac{\$30}{\$1,698} \times \frac{9}{12}$ =$30.48). Combining the two scores suggests a total impact of $83.14 billion for 2008 (0.83 × $63.45 + $30.48 = $83.14). As these were all annualized figures applicable to a time-limited policy, we do not invoke the two-year rule, but allocate half this amount, or $41.57 billion, to Fannie for the year starting February 2008, while assigning the remaining half to Freddie Mac (see below).

On January 28, the House introduced a stimulus bill negotiated with the administration, which included the eventually enacted increase in the conforming loan limits, and the bill was passed in the House the next day. The companion bill introduced in the Senate, however, had no provision for hiking the loan

[80]The FHFA was created by HERA to replace OFHEO as the housing GSEs' regulator (see below).

limit. But on February 7, 2008, the Senate passed a version of the bill including the conforming loan limit increase, and the House made it clear that it intended to pass the Senate version. Shares of Fannie increased 3.4% on February 7, closing 2.6 percentage points above the S&P 500 for the day, whereas shares posted a smaller 2.0 percentage point excess return over the S&P 500 on the date of enactment.[81] We date the pertinent timing of the policy to the Senate's February 7 passage of the House version of the bill.

The preamble of the revealingly titled Economic Stimulus Act stated that its purpose was to "***provide economic stimulus*** *through recovery rebates to individuals, incentives for business investment, and an increase in conforming and FHA loan limits*." President George W. Bush's signing statement described the bill as "*a* ***booster shot for our economy****: a package that is robust,* ***temporary****, and puts money back into the hands of American workers and businesses. Congress passed a really good piece of legislation, and they did so in a* ***very expeditious manner****. The bill I'm signing today is large enough to have an impact, amounting to more than $152 billion this year, or about 1 percent of GDP*" (Bush (2008)). Given policymakers' explicit cyclical motivations and the short time horizon of both the bill's legislative history and policy focus, we classify the introduction of super-conforming loan limits as cyclically motivated.

OFHEO Reduces Capital Surcharge

Announced: March 19, 2008

[81] Even more pointedly, Freddie's stock price increased 6.6% on February 7, closing 5.8 percentage points above the S&P 500 for the day, whereas its shares were flat on the day of enactment, compared with a gain of 1.4% for the S&P 500.

Policy Change:	Removal of Portfolio Limit
Agency:	FNMA
Impact:	+$9.28 billion
News:	Feb. 2008
Effective:	Mar. 2008
Classification:	Non-Cyclical
Policy Change:	Reduced Capital Surcharge
Agency:	FNMA
Impact:	+$53.33 billion
News:	Mar. 2008
Effective:	Mar. 2008
Classification:	Cyclical

On February 27, 2008, OFHEO announced that the caps on the Enterprises' portfolios were being removed effective March 1, 2008. Fannie and Freddie had begun filing timely financial reports again, for the first time since the accounting scandals, which purportedly motivated the change (The New York Times (2/28/2008)). OFHEO also noted substantial progress made by both GSEs in reforming and improving internal systems and controls. Citing recent losses and market conditions, however, OFHEO deliberately retained the 30% capital surcharge above the statutory minimum capital requirement, but noted that it would discuss phasing out the surcharge buffers as the Enterprises' consent orders approached being lifted. Regarding the decision not to remove the capital surcharges, OFHEO Director James Lockhart stated "*[w]e have to be very careful in this market not to do too much... This capital has served them extremely well over the last nine months*" (The New York Times (2/28/2008)).

To assess the impact of the removal of the portfolio limits, we rely on the January 23, 2008 Greenbook forecasts of 3.1% and 3.0% growth in mortgage debt for 2008 and 2009, respectively. Applying this growth rate to a retained portfolio of $727.75 billion at year end 2007 suggests a projected increase for 2008 and 2009 of $8 billion and $15.7 billion, respectively, in mortgage assets in excess of the 2% growth permitted before the removal of the portfolio limits. Pro-rating growth between the two years, we assign a potential annualized increase in Fannie's retained portfolio of $9.28 billion ($\$8.0 \times \frac{10}{12} + \$15.7 \times \frac{2}{12} = \$9.28$), with news of the change being made public in February 2008. A fund manager, however, suggested that in the deteriorating mortgage market conditions the remaining capital surcharges were much more of an impediment to portfolio growth than the portfolio caps: "*Given the losses that the agencies are taking, the binding constraint to the growth of the portfolio is not the Ofheo caps but the regulatory capital*" (Financial Times (2/28/2008)).

The decision to remove the Enterprises' portfolio caps was announced "*just hours after Fannie Mae was able to successfully file its 2007 financial statements on time*" and Freddie was expected to report its 2007 statements later that day, also on time (The Wall Street Journal (2/28/2008)). Lifting the caps was framed by the *Financial Times* as giving "*a green light to expand their loan portfolios yesterday amid mounting evidence that the US housing slump is deepening*" (Financial Times (2/28/2008)), but we could find no direct evidence that the caps were tied to market conditions rather than the Enterprises' timely filings. Moreover, OFHEO was making good on a September 2007 commitment "*to give the Enterprises more flexibility to increase their portfolios, in line with the agreements, when they produced timely financial reports*" (OFHEO Annual Report 2008, p. 63). Consequently, we classify the removal of the portfolio caps in February as principally motivated

by a standing regulatory commitment and not cyclically motivated.

The removal of the Enterprises' portfolio caps quickly escalated pressure from Congress, particularly Senator Schumer, to also immediately remove their capital surcharges. The financial crisis also escalated considerably immediately following OFHEO's removal of the portfolio limits. Rumors had surfaced in early March that Bear Stearns was in trouble, precipitating a market selloff; after a first failed attempt to provide a federal lifeline to the investment bank, the Fed arranged a fire sale takeover over by JP Morgan Chase over the weekend of March 16-17 (Johnson and Kwak (2010), pp. 158–159).[82] Along with announcing its approval of the financing arrangement for JP Morgan's acquisition on March 16, 2008, the Fed also announced two new policy moves to provide increased liquidity.[83]

On March 19, Fannie, Freddie, and OFHEO jointly announced an "*initiative to increase mortgage market liquidity*" (OFHEO (2008)). As part of the initiative, the capital surcharge was reduced from 30% to 20% of the minimal capital requirement, effective immediately. And as part of a deal, Fannie and Freddie promised to raise additional capital and buy more mortgage securities to calm financial markets. The plan effectively reduced Fannie's capital requirement from $41.5 billion to $38.3 billion, or a reduction of $3.2 billion (The Washington Post (3/20/2008)). Made possible by the earlier removal of the portfolio caps, OFHEO estimated that the combined reduction of required capital of about $5.9 billion would allow Fannie and Freddie to immediately add up to $200 billion worth of MBS to their portfolios (OFHEO (2008)). OFHEO Director James Lock-

[82] As an investment bank, Bear Stearns was, at the time, ineligible for direct loans from the Federal Reserve.

[83] These included a Primary Dealer Credit Facility to allow investment banks to borrow directly from the Fed for the first time, and a 25 basis point reduction in the primary credit rate (Federal Reserve Press Release March 16, 2008).

hart stressed that "*both companies have prudent cushions above the OFHEO-directed capital requirements and have increased their reserves. We believe they can play an even more positive role in* ***providing the stability and liquidity the markets need right now***" (OFHEO (2008)).

OFHEO's projected $200 billion impact on the Enterprises' holdings is consistent with the release of a combined $5.9 billion in capital leveraged at the 3% minimum capital requirement. For FNMA, the release of $3.2 billion in capital could thus expand their potential retained portfolio by up to $106.7 billion ($\frac{\$3.2}{0.03}$ =$106.7). Using the two-year rule, we assign an annualized impact of $53.33 billion for FNMA's retained portfolio in the year starting March 2008 resulting from the capital surcharge reduction, its news having been made public earlier that month.

On the announcement of the cap's removal, shares of Fannie jumped in mid-day trading on February 27, initially gaining up to 17%; shares closed up 1.1% for the day, or 1.2 percentage points above the daily return on the S&P 500, as markets priced in both OFHEO's move and worse-than-expected fourth quarter losses also announced later that day (Dow Jones Newswires (2/27/2008)). Fannie's stock soared again on March 18, 2008, a day ahead of the announced surcharge relaxation, as OFHEO announced a press conference for the following day and the *Wall Street Journal* reported that the regulator was "*close to reducing—but not eliminating—an excess-capital requirement*" (The Wall Street Journal (3/18/2008)). Later in the day *Reuters* reported that "*a source familiar with the deal said the companies would be granted on the order of $200 billion in new mortgage-buying power, which amounts to a one-third reduction in their excess capital*" (Reuters (3/18/2008)). Shares rose 27.1% on March 18, gaining 22.8

percentage points more than the S&P 500, and another 8.8% on March 19, rising 11.3 percentage points above the daily return on the S&P 500.

OFHEO's press release regarding the capital surcharge reduction stressed that the move was "*expected to provide up to $200 billion of* ***immediate liquidity to the mortgage-backed securities market***" (OFHEO (2008)). The reduction of the capital surcharge from 30% to 20% of minimum capital requirement was specifically attributed to a mix of "*[reporting and control compliance] progress, the* ***public purpose*** *of the two companies, and* ***ongoing market conditions***." Given policymakers' unequivocally stated cyclical motivations and the short time horizon and narrow focus of the policy change, we classify the reduction of capital surcharges as cyclically motivated.

Provisional Fed Lending to Fannie and Freddie

Announced: July 13, 2008

On July 13, 2008, the Federal Reserve Board of Governors authorized provisional lending to Fannie and Freddie if such lending proved necessary. The move was intended to supplement the Treasury Department's statutory lending authority and to "***promote the availability of home mortgage credit during a period of stews in financial markets***" (Annual Report of the Federal Reserve Board 2008, pp. 216–217). No lending was made under this authorization before the Enterprises were taken into government conservatorship on September 7, 2008 (see below).

OFHEO Reduces Capital Surcharge

Announced: May 19, 2008

Policy Change:	Reduced Capital Surcharge
Agency:	FNMA
Impact:	+$17.75 billion
News:	May 2008
Effective:	May 2008
Classification:	Cyclical

On May 6, 2008, Fannie announced a plan to raise $6 billion in capital, including a common stock offer. Fannie also announced that it planned to cut its third quarter dividend from 35 cents to 25 cents. OFHEO concurrently informed Fannie that it had lifted its May 2006 Consent Order, effective immediately, and would reduce the standing OFHEO-directed capital surplus requirement from 20% to 15% above Fannie's statutory minimum capital requirement when the capitalization plan was successful completed. OFHEO also informed Fannie that it intended to reduce the capital surcharge by an additional 5 percentage points by September 2008, provided Fannie could maintain excess capital well above OFHEO's regulatory requirement (Fannie Mae Offering Circular May 8, 2008).

Fannie CEO Daniel Mudd said the extra capital would be used to "*shore up [FNMA's] financial strength, 'pursue the best business opportunities we have seen' and* ***help the housing market recover***" (The Washington Post (5/7/2008)). Mudd added that Fannie was "*being asked to play a broader role in the future of US housing.*"

On May 19, 2008, OFHEO announced that Fannie's capital surcharge was being reduced from 20% to 15% above the statutory minimum capital requirement. Based on the statutory minimum capital requirement of $31.335 billion

as of March 31, 2008, the 5 percentage point reduction in the capital surcharge would have freed up $1.57 billion in working capital, effective immediately. FHFA reported that Fannie's core capital had been $42.676 billion at the end of March (FHFA (2008a)). The *Washington Post* reported that "*Each dollar of additional capital it raises would enable it to increase its mortgage holdings by about $35 or expand its mortgage guarantees by about $193, according to OFHEO*" (The Washington Post (5/7/2008)). Fannie's retained mortgage portfolio totaled $726.7 billion and its guaranteed MBS held by third parties totaled $2,201.0 billion as of March 31, 2008 (FNMA 10-Q Filing Report, March 31, 2008, p. 3), suggesting that these volumes were supported by roughly $20.8 billion and $11.4 billion in capital, respectively. In keeping with this split, we assume 64.8% of the released capital would have been allocated to retained portfolio expansion as opposed to its MBS guarantee book, allowing an expansion of up to $35.6 billion from the 5 percentage point capital surcharge reduction ($\$1.57 \times \frac{\$20.8}{\$20.8+\$11.4} \times 35 = \$35.5$). Using the two-year rule, we assign a potential annualized increase to Fannie's retained portfolio of $17.75 billion for the year starting May 2008.

OFHEO's announcement that the consent order was being lifted and portfolio surcharges eased appears to have been unanticipated; after falling more than 7% in morning trading on the news of a $2.2 billion first quarter loss, shares rebounded to gain 7.1% by the afternoon "*as investors focused their attention on the concession that Fannie won from the Office of Federal Housing Enterprise Oversight*" (Financial Times (5/7/2008)).

The *Financial Times* framed the regulatory change as Fannie having "*received permission from its regulator to expand its activities amidst the* ***global credit squeeze***" (Financial Times (5/7/2008)). And according to the *Financial Times*, "*Members*

of Congress [had] called for the surplus capital requirement to be lowered or eliminated so that Fannie and Freddie can buy more mortgages and ***help stabilize the market***" (Financial Times (5/7/2008)). Given policymakers' stated objective, the similarities between OFHEO's March and May capital surcharge reductions, and the prevailing economic context, we also classify the May reduction as cyclically motivated.

Housing and Economic Recovery Act of 2008 (Pub. L. 110-289)

Enacted: July 30, 2008

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FNMA
Impact:	-$13.34 billion
News:	July 2008
Effective:	Jan. 2009
Classification:	Cyclical

The omnibus housing bill overhauled regulatory oversight of the GSEs and the FHA mortgage insurance program, and enacted an array of other housing-related provisions.[84] With regard to the GSEs, the Act ordered the dissolution of OFHEO, FHFB, and HUD's GSE mission team and consolidation of their responsibilities into a new independent agency, the FHFA, tasked with regulating Fannie, Freddie, and the FHLBanks. The FHFA was granted more power to set capital requirements than OFHEO had been, and was newly authorized to take the GSEs into conservatorship or receivership if classified as 'critically undercapitalized,' with a large amount of discretion to determine whether such

[84]Other provisions included a first-time homebuyer credit, an expanded low-income-housing tax credit, and a HOPE for Homeowners program enabling the FHA to insure up to $300 billion of newly refinanced mortgages through FY2011 (CQ (2009a)).

action was necessary. The Act also legislated that HUD's annual housing goals for 2008 would remain in effect for 2009 and thereafter, until the FHFA adjusted the goals.

Of considerable near-term consequence, HERA temporarily authorized the Treasury Department to make unlimited capital and debt investments in Fannie and Freddie, up until a December 31, 2009 sunset. Late in the bill's development, Treasury Secretary Hank Paulson had urged Congress to amend the bill to include "*largely unfettered authority to provide Fannie and Freddie with capital and potentially to take them over*" after the Enterprises had taken a beating in financial markets in early July (see below), and confidence was starting to erode regarding their ability to repay some $1.5 trillion in debt (CQ (2009b)). Congress acquiesced to Treasury's request of not limiting a potential capital injection into the Enterprises, but the Act increased the statutory debt ceiling from $9.815 trillion to $10.615 trillion, which *Congressional Quarterly* characterized as intended to provide enough room for Treasury to potentially intervene but also to "*set the limit for Treasury's purchase of stock*" (CQ (2009a)).

The Act set a new structure for conforming loan limits for the nation as a whole, as well as for high-cost areas, which would be annually indexed based on a home price index chosen and maintained by the FHFA director. The FNMA Charter Act was amended to set the national conforming loan limit at $417,000 and increase the loan limit for high-cost areas, defined as areas in which 115% of the median home price exceed the national limit, permanently setting super-conforming loan limits to the lesser of 115% of the area median home price or 150% of the conforming loan limit. The changes were effective December 31, 2008, when the ESA super-conforming loan limit was set to expire. The Act also

established that the conforming loan limit would be changed, effective January 1 of each year, by the percentage change in the FHFA's preferred home price index over a preceding 12-month period; and if the home price index was falling, no downward adjustment would be made.

On November 7, 2008, FHFA announced that the single-family home conforming loan limit for most areas of the country would be kept at $417,000 for 2009, thus setting the super-conforming loan limit to 115% of the area median home price, but not to exceed $625,500 (FHFA (2008b)).[85] The lower super-conforming loan limit authorized as a result of HERA took effect on January 1, 2009, a decrease from the $729,750 maximum temporarily set by ESA for 2008. Adopting a current policy baseline from the ESA limits, we consider this a reduction in the conforming limit, further underscored by the House bill's intent to maintain ESA's higher super-conforming formula, which was clawed back in conference (see below).

As noted above, FHFA subsequently reported that the Enterprises acquired approximately $30 billion in mortgages in 2010 with loan balances between the $729,750 limit set by ESA and the lower limits subsequently set in accordance with HERA, or roughly 1.8% of the $1.698 trillion total origination volume in 2010 (FHFA Mortgage Market Note 11-01, p. 4). Applying that percentage to 2008 originations of about $1.51 trillion yields roughly $26.68 billion in originations between the two conforming loan limits ($\$1,510 \times \frac{\$30}{\$1,698} = \$26.68$). We do not invoke the two-year rule as these were all annualized figures, but we allocate half this potential reduction in purchases, or $13.34 billion, to Fannie while assigning the other half to Freddie Mac (see below).

[85] Because home price indices were declining, it should have been no surprise that the statutory indexation floor set by HERA would bind instead of the FHFA announcing a higher conforming loan limit for 2009.

We do not consider news of the reduction from the ESA to HERA conforming loan limit to have been made public until the conference version of HERA was agreed upon in July 2008. Work on the bill had begun in February 2008, drawing in part from unmoved legislation from 2007. The Senate passed a first version of a mortgage relief bill on April 10, focused largely on housing tax provisions, but which would not have overhauled conforming loan limits and high-cost area provisions (CQ (2009b)). The House passed a more expansive version of the bill on May 10, which included, among other amendments, language increasing the GSEs' conforming loan limits. But the House-amended bill was almost entirely replaced with a substitute when the Senate took the measure up again, which was passed on July 7, and substantive differences remained between the two chambers' versions regarding conforming loan limits. The enacted conference bill, which was not finalized until July 22, included the Senate's preferred formula of the lesser of 115% of the median home price or $625,000, as opposed to House's preferred extension of the higher ESA formula (CQ (2009b)). According to *CQ Almanac*, the escalating "*crisis swept away the remaining differences over the mortgage provisions*" (CQ (2009b)).

The White House had been threatening to veto the bill because of objections to various mortgage lending and Community Development Block Grant provisions, but the veto threats were dropped in late July to secure the inclusion of the GSE bailout authority. Treasury Secretary Paulson "*recommended that Bush sign the bill because of the* ***urgency of providing a backstop to the mortgage finance*** *giants in order to* ***calm the jittery financial markets***" (CQ (2009b)). Paulson had also urged Congress to pass the bill before the looming August recess. Senators Chris Dodd and Richard Shelby, the Chairman and Ranking Member, respectively, of the Senate Committee on Banking, Housing, and Urban Affairs

issued the following statement upon the bill's enactment: "*Today marks an important change in the federal government's response to the economic strain being felt by millions of Americans across the country and our financial markets. This is the most sweeping housing legislation since the Great Depression, representing a turning point in our country's* ***commitment to economic growth*** *and affordable housing, and* ***providing relief to homeowners*** *and communities across the country. I congratulate the President for signing it, and I am committed to ensuring that this law is implemented effectively and expeditiously, and that it fulfills its promise to* ***prevent foreclosures, restore home values, stabilize our housing markets, and create economic growth***" (Senate Committee on Banking, Housing and Urban Affairs (2008)). Given this context and the bill's extensive provisions aimed at increasing home purchases, boosting refinancing activity, mitigating foreclosures, and calming financial markets, we classify enactment of the tellingly titled Housing and Economic Recovery Act as cyclically motivated.

FHFA Conservatorship

Announced: September 7, 2008

Policy Change:	Portfolio Limit Increase
Agency:	FNMA
Impact:	+$67.5 billion
News:	Sep. 2008
Effective:	Sep. 2008
Classification:	Cyclical

As their losses and capital position worsened, concerns about a possible government takeover of Fannie and Freddie increased markedly in July 2008. The two Enterprises had posted cumulative losses exceeding $11 billion for op-

erations spanning July 2007 through March 2008. The *Wall Street Journal* reported on July 10 that the Bush administration had been holding increasingly serious talks about contingency plans for the agencies faltering, prompting a heavy market selloff; shares of Fannie and Freddie fell 13% and 24%, respectively, to both close at their lowest values since 1992 (The Wall Street Journal (7/10/2008)). Treasury Secretary Hank Paulson's attempts to assuage investors' fears that common shareholders would be wiped out if either company were taken into receivership—notably "*suggesting that no government takeover of Fannie and Freddie was imminent*"—backfired, and shares of Fannie and Freddie closed the week down roughly 30% and 45%, respectively (The New York Times (7/12/2008)). Concerns about a bailout and wild swings in the GSEs' share prices spilled over into one of the most volatile days of trading since the collapse of Bear Stearns in March. On July 14, the Federal Reserve announced that it would grant Fannie and Freddie access to its discount window, while the Treasury announced its intention to seek legislation expanding the GSEs' statutory credit lines with the Treasury Department. Treasury's request for GSE bailout authority was quickly amended onto HERA, enacted July 30, which authorized unlimited purchases of the Enterprises' securities through 2009 (see above).

In early September, reports started to leak that an imminent rescue deal was expected to involve placing Fannie and Freddie in conservatorship of the FHFA (The Wall Street Journal (9/6/2008), The New York Times (9/6/2008)). On September 7, one week before Lehman's failure, the Treasury and FHFA announced that Fannie and Freddie were being placed in government conservatorship; the Enterprises had collectively posted losses exceeding $14 billion in the preceding four quarters. In conjunction with the conservatorship ar-

rangement, Treasury announced it was providing two facilities to support the Enterprises.[86] A Government Sponsored Enterprise Credit Facility was made available to provide liquidity through short-term loans collateralized by agency MBS, as needed, until December 31, 2009. And a Senior Preferred Stock Purchase Agreement (SPSPA) was entered with each Enterprise to ensure they would have positive net worth for a considerable time. Under its SPSPA, Treasury agreed to provide Fannie with up to $100 billion in capital in exchange for senior preferred stock and warrants representing an 79.9% ownership stake; 80% ownership would have triggered a budgetary requirement to carry the Enterprises' obligations on the federal government's balance sheet, which the administration was keen to avoid. The Treasury Department received an initial $1 billion in senior preferred stock from each Enterprise, which carried a mandatory 10% annual dividend to be paid quarterly. If the FHFA determined that either Enterprise's liabilities exceeded its assets, as measured by GAAP, the Treasury would provide capital making up the difference and an equal amount would be added to the Treasury's senior preferred stock holdings, again carrying a 10% dividend rate. The SPSPA contracts were indefinite in duration, and could only be amended or removed by mutual agreement (FHFA (2008c)).

As part of the SPSPA, Fannie's retained mortgage and MBS portfolio was capped at $850 billion as of December 31, 2009, with this limit to be subsequently reduced by 10% each year until reaching $250 billion in 2021 (FHFA (2008c)). Prior to being taken into conservatorship, Fannie's total retained portfolio was approximately $760 billion as of August 30, 2008, and the conservatorship portfolio cap was deliberately set considerably higher. Within two weeks of entering conservatorship, "*Fannie and Freddie were instructed to ramp up their mortgage*

[86]Treasury also initiated a temporary agency MBS purchase program (see listing under US Treasury Department, Sec. 3.4.5).

bond purchases as the financial crisis deepened and credit activity came to near standstill" and the financial press began reporting in October that federal regulators were ordering each Enterprise to purchase at least $20 billion in mortgage securities each month, of "*mostly subprime, Alt-A and non-performing prime mortgage securities*" (MarketWatch (10/11/2008)). The Treasury Department's language also strongly suggested that the GSEs' were being compelled to increase their mortgage holdings before their portfolio limits began to ratchet down. In a press statement, Treasury Secretary Paulson explained "*the primary mission of these enterprises now will be to* ***proactively work to increase the availability of mortgage finance***," elaborating that in order "*to* ***promote stability in the secondary mortgage market*** *and lower the cost of funding,* ***the GSEs will modestly increase their MBS portfolios through the end of 2009****. Then, to address systemic risk, in 2010 their portfolios will begin to be gradually reduced at the rate of 10 percent per year, largely through natural run off, eventually stabilizing at a lower, less risky size*" (Department of the Treasury (2008a)).[87] The *Washington Post* cited anonymous government officials explaining that the GSEs would "*expand their lending programs to make mortgages available to more borrowers*," with a source elaborating that "*[t]he companies were starting to contract, and that was not very useful... They were having trouble fulfilling this mission*" (The Washington Post (9/9/2008)). We thus considerer the FHFA conservatorship agreement to be a binding political constraint forcing a balance sheet expansion.

In his September 7 statement announcing and detailing the move to conservatorship, FHFA Director Lockhart explained that "*the Enterprises will be allowed to grow their guarantee MBS books without limits and continue to "****purchase replace-***

[87]FNMA stated an "*intention to hold the majority of our mortgage assets to maturity to realize the contractual cash flows*" (FNMA 10-K Filing Report 2008, p. 43), further suggesting that post-conservatorship purchases would expand its balance sheet.

ment securities for their portfolios, about $20 billion per month without capital constraints" (FHFA (2008d)). The FHFA subsequently announced on October 10 that the capital classifications of Fannie Mae and Freddie Mac were being suspended and none of the standing regulatory capital requirements would be in effect during conservatorship (FHFA (2008a)). Paulson had acknowledged that "*[d]uring this ongoing housing correction, the GSE portfolios have been constrained, both by their own capital situation and by regulatory efforts to address systemic risk,*" but explained that "*the* ***GSEs are expected to moderately increase the size of their portfolios over the next 15 months through prudent mortgage purchases***" (Department of the Treasury (2008a)). The easing of regulatory efforts to address systemic risk were clearly intended to enable retained portfolio growth. We do not consider the release of working capital from eliminating the remaining capital surcharge to be a binding constraint, as it would have allowed a greater balance sheet expansion than permitted by the portfolio cap, which we view as the only constraint.[88]

Given the volatile mortgage market conditions and heightened political risk surrounding agency debt and equity, we do not attempt to estimate the counterfactual evolution of the Enterprises' mortgage portfolios in the absence of the SPSPA agreements and simply measure the impact relative to the portfolio outstanding on August 30, 2008. On that date, Fannie's total retained portfolio was approximately $760 billion, implying a maximum increase of $90 billion enabled by the SPSPA by the end of 2009, or an annualized $67.5 billion increase over the next year ($\$90 \times \frac{12}{16} = \$67.5$).[89]

[88]Based on the statutory minimum capital requirement of $32.63 billion as of June 30, 2008, the elimination of the remaining 15% capital surcharge would have freed up $4.89 billion in working capital, effective immediately (FHFA (2008a)).

[89]We do not invoke the two-year rule because of the political pressure to immediately ramp up purchases by $20 billion a month and the scheduled tightening of portfolio caps after 2009.

While speculation about the Enterprises being taken into conservatorship had been growing since July, we found no evidence that a compelled portfolio expansion and/or elimination of capital constraints had been anticipated before September 2008, our determination of the news of the conservatorship policy details being made public. Shares had already fallen 88.8% in the year to September 5, 2008, but conservatorship clearly had not been fully priced into Fannie's shares, and the announcement wiped out nearly all remaining stockholder equity. When markets reopened on Monday, September 8, shares of Fannie collapsed 89.6%, to 73 cents, from previously closing at $7.04 per share. Hereafter we largely cease reporting information about Fannie's share price, as its movements became highly volatile and generally uninformative after hitting penny stock status.

In a statement, President Bush emphasized that "*[p]utting these companies on sound financial footing and reforming their business practices is* ***critical to the health of our financial system and to making further progress with the housing correction that today is weighing heavily on our economy.*** *Allowing the companies to fail or further deteriorate would damage our home mortgage market and could weaken other credit markets that are unrelated directly to housing. Americans should be confident that the actions taken today will strengthen our ability to weather the housing correction and are critical to* ***returning the economy to stronger sustained growth***" (Bush (2008)). Less than one month later, the Emergency Economic Stabilization Act of 2008 (Pub. L. 110-343, enacted October 3, 2008) authorized a $700 billion Troubled Asset Relief Program (TARP) fund to be used by the Treasury Department to further bolster the US financial system. Given the prevailing economic contact and the justifications of Secretary Paulson and President Bush, we classify taking Fannie and Freddie into conservatorship as clearly cyclically

motivated.

American Recovery and Reinvestment Act of 2009 (Pub. L. 111-5)

Enacted: February 17, 2009

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FNMA
Impact:	+$13.34 billion
News:	Feb. 2009
Effective:	Feb. 2009
Classification:	Cyclical

Shortly after the FHFA announced the super-conforming loan limit was being reduced for 2009 pursuant to HERA, Congress intervened to statutorily restore ESA's higher super-conforming loan limit. On February 17, 2009, the American Recovery and Reinvestment Act of 2009 (ARRA) re-established the $729,750 maximum super-conforming loan limit for mortgages originated during calendar year 2009, which had lapsed at the end of 2008 (see above). Often referred to simply as the 'Recovery Act,' ARRA was a package of deficit financed tax cuts, transfers to state and local governments, increased unemployment benefits and safety net spending, and infrastructure investment; it was the largest fiscal stimulus bill enacted to combat the Great Recession, estimated at the time to cost $787 billion by the CBO.[90]

The sunset of the higher super-conforming loan limit reestablished by ARRA was extended twice. The Department of Interior, Environment, and Related Agencies Appropriations Act of 2010 (Pub. L. 111-88, enacted October 30, 2009)

[90] ARRA's price tag was subsequently revised to $840 billion (CBO (2015)).

extended the $729,750 maximum super-conforming loan limit for mortgages originated through the end of calendar year 2010. The Treasury Secretary and HUD Secretary had both been calling on Congress to renew the elevated super-conforming loan limit as part of a broader initiative to support the housing market, including a temporary extension of the first-time homebuyer tax credit (American Banker (10/30/2009)). Industry trade groups had also been lobbying, rather successfully, for an extension well ahead of its expiration, citing that uncertainty about its extension was making it harder to originate loans with balances above $625,500 (National Mortgage News (11/2/2009)). The Continuing Appropriations Act of 2011 (Pub. L. 111-242, enacted September 30, 2010) again extended the $729,750 maximum limit for mortgages originated through the end of FY2011 (September 30, 2011), after which the temporary statutory limits expired and the lower permanent limits under HERA would again become binding.

We again estimate that the difference between the ESA and HERA super-conforming loan limits for 2009 would have amounted to roughly $26.7 billion in annualized originations being purchased by the Enterprises (see HERA above), and allocate half this potential increase in retained portfolio purchases to Fannie. The bill was introduced in the House in late January, considered in the Senate in early February, and passed and enacted within three weeks of being introduced. The enacted bill more closely resembled the Senate-passed bill, which faced a much tougher legislative hurdle of requiring three Republican votes to clear a filibuster, and we date the news of the conforming loan limit increase to the Senate's passage of the bill on February 10 (CQ (2010)). We consider the two subsequent extensions to reflect a continuation of current policy in the aftermath of the Great Recession, assigning no impact.

The preamble of ARRA stated that its purpose was "*[m]aking supplemental appropriations for job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization*." Upon signing the bill into law, President Barack Obama offered the following characterization of the stimulus package and the economic context motivating it: "*The Act provides a* ***direct fiscal boost to help lift our Nation from the greatest economic crisis in our lifetimes and lay the foundation for further growth****. This recovery plan will help to* ***save or create as many as three to four million jobs*** *by the end of 2010, the vast majority of them in the private sector... The situation we face could not be more serious. We have inherited an* ***economic crisis as deep and as dire as any since the Great Depression***" (Obama (2009)). We classify ARRA's increase in the super-conforming loan limit as clearly cyclically motivated.

Homeowner Affordability and Stability Plan

Announced: February 18, 2009

Policy Change:	Portfolio Limit Increase
Agency:	FNMA
Impact:	+$50.0 billion
News:	Feb. 2009
Effective:	May 2009
Classification:	Cyclical

On February 18, 2009, President Obama announced the Homeowner Affordability and Stability Plan, a set of new initiatives and $75 billion in funding to support the housing and mortgage markets.[91] The first two prongs of the hous-

[91]The Homeowner Affordability and Stability Plan would also come to be known as the Mak-

ing initiative were mortgage refinancing programs, one assisting refinancing by non-delinquent homeowners with conforming loans owned or guaranteed by Fannie and Freddie (the Home Affordable Refinance Program, or HARP) and another helping homeowners with documented hardship via write-down modifications to their existing mortgages (the Home Affordable Modification Program). The third and final prong was to "*support low mortgage rates by strengthening confidence in Fannie Mae and Freddie Mac*" (Department of the Treasury (2009a)), and the Treasury's press release noted that purchases under their agency MBS program would continue in conjunction with the Homeowner Affordability and Stability Plan (see listing under US Treasury Department, Sec. 3.4.5). The HARP program was intended to help 4- to- 5 million homeowners refinance mortgages guaranteed by Fannie or Freddie, in part by removing the restriction that the Enterprises could not refinance mortgages valued at more than 80% of a home's worth, thus granting underwater homeowners access to credit for refinancing (Obama (2009)). The loan modification program was to be financed with up to $50 billion in TARP funds and $25 billion from the Enterprises.

As part of the plan, Fannie's mortgage portfolio cap was revised upward to allow a maximum retained portfolio of $900 billion as of December 31, 2009, up from the $850 billion cap set by the initial FHFA conservatorship agreement. The new agreement, however, maintained the wind-down requirement of 10% annual reductions to the retained portfolio cap until it reached $250 billion, just from a higher starting point. These modifications were formally established in an amendment of the SPSPA agreement on May 6, 2009. Based on Fannie's current mortgage portfolio, the revision also delayed requiring Fannie reduce its

ing Home Affordable plan.

portfolio in 2010, increasing that limit by $45 billion relative to the first SPSPA.[92] We measure the impact of the SPSPA amendment as the difference in portfolio limits and mandated reductions before and after the amendment, assigning an annualized increase in Fannie's potential portfolio of $50 billion, with the news of Fannie's increased purchase capacity being made public in February 2009.

In conjunction with the rollout of the Homeowner Affordability and Stability Plan, the Treasury Department also announced that it was amending the SPSPAs to increase the Treasury's maximum funding limit for each Enterprise from $100 billion to $200 billion (Department of the Treasury (2009a)). Neither Fannie nor Freddie were close to having exhausted the initial $100 billion, having collectively drawn about $66 billion to date, but the move was intended to bolster confidence in the Enterprises. The increased funding commitments were intended to help the Enterprises "*carry out ambitious efforts to ensure mortgage affordability for responsible homeowners, and provide forward-looking confidence in the mortgage market*" (Department of the Treasury (2009b)). The May amendments to the SPSPA also increased the Enterprises' maximum permissible level of indebtedness from 110% of its debt outstanding as of June 30, 2008, as stipulated in the first agreement, to 120% of the prevailing retained portfolio limit (FHFA (2009a)).

Market analysts characterized the administration as exploiting control over the Enterprises in order to address the foreclosure crisis, and in a manner that would probably worsen their losses—hence the increased Treasury commit-

[92] On December 31, 2008, the total retained portfolio was approximately $792 billion, implying a maximum increase of $108 billion by the end 2009, an increase of $18 billion by end 2010, a decrease of $63 billion by end 2011, and a total portfolio reduction of $542 billion by the end of 2022. Before the SPSPA amendment, these corresponding portfolio changes would have been an increase of $58 billion in 2009 followed by decreases of $27 and $103.5 billion in 2010 and 2011, respectively.

ments and continued purchase of agency securities to assuage investors (Dow Jones Newswires (2/18/2009)). For their part, Fannie promised to work with the administration, the FHFA, and industry partners.

The stated purpose of the increased lines of funding and the elevated retained portfolio caps was "*to ensure the* ***strength and security of the mortgage market****, to help maintain mortgage affordability, and to help keep interest rates low*" (Department of the Treasury (2009b)). President Obama's remarks about the program emphasized that the government was taking "*major steps to* ***keep mortgage rates low***" and that the plan would "*help us* ***end this crisis***" (Obama (2009)). We classify the Homeowner Affordability and Stability Plan and the increased retained portfolio limit as cyclically motivated.

Enterprise Transition Affordable Housing Goals for 2009

Issued: August 10, 2009

After reviewing market conditions, FHFA concluded that meeting the affordable housing goals for 2009 would not be feasible unless they were adjusted. Revised goals issued on August 10, 2009 lowered the low- and moderate-income goal from 56% to 43% in 2009; the underserved areas goal from 39% to 32%; and the special assistance goal from 27% to 14%. The reason given by FHFA was that market conditions, such as stricter underwriting standards, increased standards of private mortgage insurers, and the elevated rate of unemployment, would result in the origination of fewer goals-qualifying loans, as would a surge in refinancing activity. Moreover, the increased market share of mortgages insured by the government and vastly decreased private-label MBS issuance would also contribute to fewer goal-qualifying mortgages being available for purchase by the Enterprises (74 FR 39873). The FHFA rule also expanded the mortgage qual-

ification for housing goals to include any mortgages already held or guaranteed by the Enterprises that had been modified as part of the Homeowner Affordability and Stability Plan (see above). Because Fannie and Freddie were already committed to temporarily expanding their retained portfolios to support the mortgage market (see above) and this policy was intended to reflect a changing landscape in mortgage originations, we do not consider this a binding, significant policy change affecting their retained portfolios.

Second Amendment to Senior Preferred Stock Purchase Agreement
Announced: December 24, 2009

On December 24, 2009, the Treasury Department announced amendments to both SPSPAs that would provide unlimited access to credit for Fannie and Freddie. The move was made just before the December 31, 2009 deadline stipulated by HERA for the Treasury to act without Congressional approval and authorization of additional funds. The amendments removed the cap from each agency's standing $200 billion funding line, effective through 2012 (FHFA (2009b)). At the time of the amendments, Treasury had injected $60 billion into Fannie and $51 billion into Freddie—well shy of their prevailing funding lines (Dow Jones Business News (12/24/2009)). The Treasury Department stated that the action "*should leave no uncertainty about the Treasury's commitment to support these firms as they continue to play a vital role in the housing market during this current crisis*" (The New York Times (12/25/2009)). We do not classify this amendment to be a binding, significant policy change affecting the Enterprises' retained portfolios, as the unlimited backstop was intended to build market confidence and, if necessary, absorb losses from purchases already constrained by the SPSPA portfolio limits.

New Enterprise Housing Goals for 2010-2011

Announced: September 2, 2010

On September 2, 2010, FHFA released new housing goals for the remainder of 2010 and 2011, which were made effective October 14, 2010 (75 FR 55892). The new regulations modified the housing goal structure and established overhauled goals for single-family, owner-occupied home mortgage purchases for low-income families; very low-income families; and families living in geographical areas with lower-income populations, areas with high concentrations of minority residents, and federally declared disaster areas. The newly issued goals again included multifamily housing subgoals, and additionally set a new refinancing mortgage goal for low-income families. The home purchase and refinancing goals were expressed as minimum goal-qualifying mortgage shares of mortgages acquired by the Enterprises.[93] The new goals also considerably restricted the pool of mortgages and mortgage securities that could count toward affordable housing goals, notably excluding private-label MBS, second mortgages, and single-family government loans (FNMA 10-K Filing Report 2010, p. 45).

In line with restricting qualifying types of mortgages, FHFA stated that it did not intend for Fannie to undertake uneconomic or high-risk activities to meet the housing goals, but rather that support should not be withdrawn from these market segments simply because the Enterprises were in conservatorship (75 FR 55892). And it is not clear that the goals were intended and/or per-

[93]The benchmark single-family goals were set at 27% for the low-income family home purchases goal, 8% for the very low-income family home purchases goal, 24% for the low-income areas home purchases goal, and 21% for the low-income family refinance goal. The low-income areas home purchases also included a subgoal that at least 13% of purchases were to finance mortgages for families in low-income census tracts or moderate-income families in minority census tracts.

ceived to have been binding; Fannie's 10-K stated that if they missed the new housing goals, FHFA would start by reevaluating how feasible those goals had been. Fannie made its multifamily subgoals and exactly hit its low-income areas home purchases goal for 2010, but missed all other single-family purchase and refinancing goals (FNMA 10-K Filing Report 2010, p. 45). In 2011, Fannie again made its multifamily subgoals and hit its refinancing goal, but missed all single-family purchase goals (FNMA 10-K Filing Report 2011, p. 48). Because this policy in part reflected changing mortgage market conditions and was not intended to expand purchase volumes, merely to retain some support for various market segments while maintaining "sound financial conditions of the Enterprises," we do not consider this a binding, significant policy change affecting their retained portfolios.

Third Amendment to Senior Preferred Stock Purchase Agreement

Announced: August 17, 2012

Policy Change:	Portfolio Limit Decrease
Agency:	FNMA
Impact:	-$22.16 billion
News:	Aug. 2012
Effective:	Aug. 2012
Classification:	Non-Cyclical

Freddie Mac returned to profitability in the fourth quarter of 2011, and Fannie Mae followed suit the following quarter (McLean (2015), pp. 114–115). The second quarter of 2012 was the first time since being taken into conservatorship that both agencies were able to pay the required 10% dividend on Treasury's senior preferred stock (Financial Times (8/17/2012)). The positive net

worth requirement in the SPSPAs forced Fannie and Freddie to borrow from the Treasury whenever their earnings fell short of the required 10% dividend, thus increasing the overall Treasury injection on which dividends would be assessed. Fannie and Freddie had collectively borrowed $188.4 billion through 2012Q2, some of which had been used to finance $45.7 billion in required dividend payments (Reuters (8/17/2012)). The circular practice of borrowing from the Treasury to repay the Treasury was reportedly undermining flagging market confidence in the Enterprises, particularly unnerving institutional investors and Asian sovereign investors of agency debt; market analysts also expected the 'borrow-to-repay problem' to worsen as the Enterprises' requisite portfolio wind-down decreased earnings (American Banker (8/20/2012)).

On August 17, 2012, the Treasury Department announced a third SPSPA amendment that would cap each Enterprise's retained portfolio at $650 billion as of December 31, 2012, and which accelerated the required portfolio limit wind down from an annual rate of 10% to 15% (Department of the Treasury (2012a)). The revised agreement would reduce the Enterprises' retained portfolios to $250 billion by 2018, four years faster than previously scheduled (FHFA (2012)). Along with accelerating their wind down, the mandatory 10% quarterly dividend was replaced by a requirement that all quarterly net profits be paid to the Treasury—eliminating both the possibility of the Enterprises having to borrow from Treasury in order to pay dividends and of the Enterprises rebuilding positive net worth (Financial Times (8/17/2012)). This revision to the SPSPAs was quickly and disparagingly coined the 'net worth sweep.' The revised portfolio caps were made effective upon signing the agreement, while the net worth sweep was to be made effective September 30, 2012.

As of July 31, 2012, Fannie's total retained portfolio was approximately $673 billion, implying a total mandated reduction by $23 billion by the end 2012, a reduction of $120.5 billion by the end of 2013, and a total reduction of $423 billion by the end of 2018. We measure the impact of the SPSPA amendment as the difference in mandated reductions before and after the third amendment. The SPSPA previously would have capped Fannie's portfolio at $656.1 billion at the end of 2012 and $590.49 billion at the end of 2013, whereas the new amendment capped the portfolio at $552.5 billion at the end of 2013.[94] We assign an annualized requisite portfolio reduction of $22.16 billion for the year starting in August 2012, being the cumulative required reduction for 2013 pro-rated through July of that year (($552.5 - $590.49)$\times\frac{7}{12}$ = -$22.16).

News of the accelerated portfolio wind down and net earnings sweep had not leaked and was clearly made public in August 2012. While the Enterprises' share prices and excess returns became exceedingly volatile and generally uninformative after conservatorship sunk shares under a dollar, stock movements nonetheless suggest that the third SPSPA amendment was genuinely unanticipated; Fannie's share price fell an unusually steep 20.0% on August 17, with trading volumes up more than ten-fold from the previous day of trading, and the news seemed to take the financial press and market analysts aback. The net worth sweep certainly flabbergasted Fannie's common shareholders—at this point primarily consisting of hedge funds, several of which had been buying up shares of Fannie and Freddie on the cheap—and the action precipitated numerous lawsuits challenging the legality of the third SPSPA.[95]

[94]The portfolio being reduced by 10% annually from $900 billion at the end of 2009 would have yielded $590.49 by the end of 2013 ($900 $\times(0.9)^4$), while the new 15% rate reduction from $650 billion at the end of 2012 would have implied a portfolio limit of $552.5 billion by the end of 2013 ($650 $\times(0.85)$).

[95]Almost all of these challenges have been thrown out to date based on HERA's highly restrictive limitations upon judicial review when the agencies are in FHFA conservatorship (see

In a press release the Treasury stated: "*We are taking the next step toward responsibly winding down Fannie Mae and Freddie Mac, while continuing to support the necessary process of repair and recovery in the housing market. ... [We want] to* ***make sure that every dollar of earnings each firm generates is used to benefit taxpayers*** " (Department of the Treasury (2012b)). The Treasury statement made clear that the overwhelming motivation for the amendment was budgetary—protecting taxpayers—as opposed to economic.[96]

According to McLean (2015), Treasury officials were concerned about the optics of hedge funds earning windfall profits from a publicly funded bailout of the Enterprises as they returned to profitability (McLean (2015), p. 114). The net worth sweep was, however, publicly justified as assuaging the concerns of foreign institutional investors regarding the 'borrow-to-repay' practice (McLean (2015), p. 115). FHFA Director Edward DeMarco explained that "*[t]hese changes provide certainty to Fannie Mae, Freddie Mac and market participants as they continue to perform their critical mission of providing liquidity and stability to the country's housing market*" (The Washington Post (8/18/2012)). DeMarco had been a driving force behind the net worth sweep, which he reportedly believed would strong-arm Congress into following his advice to "*abolish the GSEs' charters as part of a broader legislative package of housing finance reform*" (National Mortgage News (12/16/2014)). The Treasury statement also signaled the intention to

SEC. 1367(a)(11)(D)).

[96]The five "*important objectives*" advanced by the amendment, in order highlighted in the statement, were: "*1) Making sure that every dollar of earnings that Fannie Mae and Freddie Mac generate will be used to benefit taxpayers for their investment in those firms; 2) Ending the circular practice of the Treasury advancing funds to the GSEs simply to pay dividends back to Treasury; 3) Acting upon the commitment made in the Administration's 2011 White Paper that the GSEs will be wound down and will not be allowed to retain profits, rebuild capital, and return to the market in their prior form; 4) Supporting the continued flow of mortgage credit by providing borrowers, market participants, and taxpayers with additional confidence in the ability of the GSEs to meet their commitments while operating under conservatorship; and 5) Providing greater market certainty regarding the financial strength of the GSEs*" (Department of the Treasury (2012b)).

wind down Fannie Mae and Freddie Mac, rather than restore them to their former role. In a 2014 speech, DeMarco, recently retired, corroborated this view, noting that "*[t]here was broad consensus at that time that not only had Fannie Mae and Freddie Mac failed, but the GSE model had failed* " (National Mortgage News (12/16/2014)).

The policy priority in Congress had also switched from promoting economic recovery to deficit reduction, most notably signaled by the legislative history and enactment of the Budget Control Act of 2011 (Pub. L. 112-25, enacted August 2, 2011). McLean (2015) noted that the third amendment came a year after the related showdown over raising the federal statutory debt ceiling, and by reducing Treasury's borrowing, the net worth sweep "*helped buy breathing room*" during subsequent fiscal showdowns (McLean (2015), p. 117). The practical effect was a significant decrease in the federal budget deficit, with Fannie and Freddie remitting more to the government as a result of the net worth sweep than they had initially borrowed. CBO estimated that the Enterprises had cumulatively paid the Treasury dividends and net earnings of $250 billion as of September 2016, and were projected to pay an additional $180 billion over the next decade under current law (CBO (2016), p. 1).[97]

There was bipartisan support for the third amendment on Capitol Hill, with Republicans supportive of starving the Enterprises of capital—seen as preventing them from rebounding, and a step toward killing them off entirely—and Democrats supportive of de facto nationalization as retaining the agencies public mission without privatizing their upside gains. The housing market had

[97]Congress had set prior precedent for exploiting the conservatorship of Fannie and Freddie for budgetary purposes; the Temporary Payroll Tax Cut Continuation Act of 2011 (Pub. L. 112-78, enacted December 23, 2011) required the Enterprises increase fees on new guarantees by 10 basis points, to be used as an offset for extending the expiring payroll tax cut. The Enterprises paid $8 billion in such guarantee fees to the Treasury over 2013-2016 (CBO (2016), p. 4).

begun to recover, enough so that the Enterprises were in a position to start rebuilding their capital bases, and the accelerated wind down only served to reduce support to the housing market. We thus classify the third SPSPA amendment as motivated by varying political priorities and budgetary concerns, as opposed to being cyclically motivated.

New Enterprise Housing Goals for 2012-2014

Issued: November 13, 2012

On November 13, 2012, FHFA issued final rules establishing new benchmark levels for the single-family housing goals for 2012 through 2014, to be made effective December 13, 2012 (77 FR 67535). The benchmark single-family goals for Fannie were decreased from 27% to 23% for the low-income home purchase goal; from 8% to 7% for the very low-income family home purchase goal; and from 21% to 20% for the low-income family refinance goal. In justifying the reduced benchmarks, FHFA pointed out that Fannie and Freddie were both unable to meet the higher benchmarks set for 2010–2011 (77 FR 67535). Because this policy was not intended to expand purchase volumes, merely to retain some support for various segments of the market while maintaining "*sound financial conditions of the Enterprises*," and does not appear to have been intended or perceived as a binding constraint for the Enterprises, we do not consider the revised goals a significant policy change affecting their retained portfolios.

3.4.2 Federal Home Loan Mortgage Corporation

The Federal Home Mortgage Loan Corporation was established by the Emergency Home Finance Act of 1970, following the 1969 credit crunch. The pur-

pose of Freddie Mac was to create a secondary market for conventional mortgages purchased from insured financial institutions and to supplement Fannie Mae in providing funds for housing, particularly in alleviating periodic credit shortages among thrift banks. Ownership was placed with the FHLBanks, and the FHLBB originally served as FHLMC's Board of Directors. Freddie was authorized to purchase and make commitments to purchase residential mortgages from the FHLBanks and their members, the FSLIC, or other financial institutions with government-insured deposits, including commercial banks, other insured S&Ls, and mutual savings banks. Freddie was initially to raise funds by issuing debt securities and by selling MBS. In 1971, Freddie started the first program of pass-through securities backed by conventional mortgages (coined 'participation certificates'). In 1983, Freddie issued the first collateralized mortgage obligation (CMO), a new type of security splitting mortgage pools into multiple classes of bonds with varying seniority.

Like Fannie, Freddie was chartered with preferential tax and regulatory treatment, including a statutory lending backstop with the Treasury Department. Freddie's debt issuance, however, was not subject to concrete leverage restrictions. And unlike Fannie, Freddie was not chartered with an explicit statutory purpose, although FIRREA amended FHLMC's charter to add such a purpose in the aftermath of the S&L crisis.

While mortgage purchases were primarily financed by debt in its first years of operation, Freddie's purchases were primarily being financed through MBS issuance by 1976. Freddie Mac was initially exposed to far less interest rate risk than Fannie Mae—and correspondingly weathered the 1980 and 1981–82 recessions much better—because its MBS were largely sold to third parties. Con-

sequently, Freddie's retained portfolio remained fairly small relative to that of Fannie through the 1980s, as it was used primarily to fund inventory for pooling mortgages into MBS or to fund new mortgage purchase programs where volume was not yet sufficient to support securitization.

In 1989, FIRREA turned Freddie from a corporation owned by the thrift industry to a publicly traded shareholder-owned corporation. FIRREA also transferred regulatory authority over Freddie to HUD, and expanded its secondary mortgage market objectives to include promoting housing for low- and moderate-income borrowers. Freddie was also extended the same $2.25 billion standby credit line with the Treasury as afforded Fannie, bolstering the perception of an implicit government guarantee of agency debt securities. After its public listing, earnings pressure drove Freddie to exploit the (newly enhanced) profitability of leveraged balance sheet expansion, and its retained portfolio began catching up with Fannie (Greenspan (2005)). Accounting scandals exposed first at Freddie and then at Fannie in the early 2000s, however, prompted greater regulatory oversight over Freddie Mac and the imposition of portfolio limitations. In September 2008, Freddie was placed under the conservatorship of the FHFA, and was ordered to first increase then gradually reduce its portfolio of mortgage assets.

Emergency Home Finance Act of 1970 (Pub. L. 91-351)

Enacted: July 24, 1970

See listing under FNMA (Sec. 3.4.1) for legislative and economic context.

On July 24, 1970, the Emergency Home Finance Act of 1970 chartered the Federal Home Mortgage Loan Corporation, or Freddie Mac, in order to create a secondary market for conventional mortgages purchased from insured financial

institutions. Title III of the Act, the Federal Home Loan Mortgage Corporation Act, established the corporation as a subsidiary of the FHLBS and a member of each of the FHLBanks. Unlike Fannie, Freddie's charter act did not initially define a statutory purpose, but according to Bartke (1972), Congressional intent was for Freddie to supplement Fannie in providing additional funds for home building and buying, as well as to alleviate the periodic liquidity problems facing the S&L industry. Freddie Mac's first Annual Report characterized its own mission as "*to increase the secondary market volume of sales and purchases of residential mortgages and, thus, to increase the effective supply of mortgage financing, the flexibility of mortgage investors and the attractiveness of mortgage investments. With the goal of improving the availability of housing to all Americans, FHLMC works to strengthen the existing secondary markets in FHA insured and VA-guaranteed mortgages and, more significantly, to develop a secondary market in non-federally insured (conventional) residential mortgages*" (FHLMC Annual Report 1972, p. 2).

Freddie was authorized to purchase and make commitments to purchase residential mortgages from the FHLBanks and their members, the FSLIC, or any other financial institution whose deposits were insured by a federal agency. Purchases of conventional mortgages were required to be of quality acceptable to private investors and were restricted to those whose principal balance outstanding was under 75% of the value of the property securing the mortgage, unless the seller retained a participation of at least 10%, the seller agreed to repurchase the mortgage on demand, and the portion of principal balance outstanding exceeding 75% was insured by a qualified private insurer. Another restriction was that conventional mortgages originated more than one year before purchase could not exceed 10% of total mortgage holdings. Finally, the Act mandated loan limits 'comparable' to those for Section 203(b) FHA mortgages,

set at $33,000 for single-family homes at the time of enactment.

Initial capital was provided through $100 million in nonvoting common stock issued only to the FHLBanks. As the owners of the FHLBanks, the thrift industry therefore indirectly owned Freddie Mac. Because the stock was nonvoting, however, the FHLBanks could not not directly influence corporate policy. Freddie was exempt from all federal and state taxation save property taxes, granted all the rights and limitations of FHLBank membership, and allowed to borrow and issue market securities. While Fannie was subject to a debt-to-capital limitation, there was no such analogous restriction for Freddie. The Act also permitted financing operations by issuing MBS.

Mortgage purchases were initially financed through long-term debt issuance. In its first year of operation, the corporation purchased $326 million in FHA/VA mortgages. In 1971, Freddie Mac developed a continuously offered program for buying participation interests in conventional mortgages. Later in 1971, Freddie started issuing Mortgage Participation Certificates ('PCs'), the industry's first conventional mortgage security.[98] PCs were pools of mortgages purchased from thrifts and packaged into pass-through securities, which were guaranteed by the corporation as to timely payment of interest and full return of principal. Sales of PCs rapidly increased from $67 million in 1971 to $493 million in 1972. Development of the security was part of the corporation's strategy to reach investors who traditionally had not financed mortgage credit. Because of tight credit markets in 1973–1975 and an investor base comprised mostly of S&Ls, the PC did not become the corporation's major source of financing until 1976 (FHLMC Annual Report 1980, p. 34). A conventional whole loan purchase

[98]In the early years of the program, mortgagees were required to maintain a participating interest in the resulting security, of roughly 5% of its total principal, hence its name (Hu (2011), p. 88).

program was introduced in 1972. By December 31, 1972, Freddie had accumulated $144 million in conventional mortgage loans in portfolio, and another $141 million worth of participations in conventional mortgage loans (FHLMC Annual Report 1972).

From the beginning, Freddie clearly planned to steer a very different course than Fannie, and focused overwhelmingly on securitization rather than portfolio growth. The first annual report in 1972 stated that: "*FHLMC does not seek to operate the national secondary mortgage market but, rather, to create an economic and regulatory climate in which the private sector can take on that function*" and "*While the temptation simply to buy mortgages and sell bonds is great, such activity does not contribute to creation of the kind of privately operated liquid secondary mortgage that FHLMC is trying to help develop* " (FHLMC Annual Report 1972, pp. 5, 8).

While the creation of Freddie Mac was unequivocally a significant policy event, we could find no estimate or convincing manner of quantifying the impact of Freddie Mac's chartering in July 1970 for its near-term purchase activity, likely the result of considerable uncertainty regarding the time frame for getting the corporation up and operational.

Presidential Plan To Revitalize the Housing Market

Announced: May 10, 1974

Policy Change:	Subsidized Mortgage Purchase Program
Agency:	FHLMC
Impact:	+$1.5 billion
News:	May 1974
Effective:	May 1974
Classification:	Cyclical

On May 10, the Nixon administration authorized Freddie Mac to make $3 billion worth of below-market forward commitments to purchase conventional mortgages from the member institutions of the FHLBank System, with funds provided by the Treasury, in support of the sagging housing industry (CQ (1975b)).[99] As part of the same four-point housing market plan to direct more than $10 billion to mortgage markets, the administration also authorized the FHLBB to provide $4 billion in loan advances to member S&Ls at interest rates below their usual borrowing costs (CRS (2004), p. 173). And the administration authorized an additional $3.3 billion for Ginnie Mae's subsidized purchases of mortgages (see GNMA, Section 3.4.3).

When Freddie launched the program on May 20, mortgagees entered a record $581 million worth of the commitments in a single day, and the full $3 billion in commitments had been exhausted within 2 months. By the end of the year, Freddie had taken delivery of $696 million worth of loans in fulfillment of these commitments and was rapidly staffing up its underwriting and purchasing staffs to ramp up its operations accordingly (FHLMC Annual Report 1974, p. 3). At the time of its announcement, however, there was no indication that

[99]The program was financed by loans from Treasury to the FHLBS, which in turn lent the funds to Freddie Mac as advances, rather than through Freddie's statutory lending backstop with the Treasury Department (FHLMC Annual Report 1977, p. 23).

Freddie's $3 billion commitment authority would be used up so quickly. Using the two-year rule, we assign an annualized $1.5 billion increase in Freddie's purchase activity for the year starting May 1974, with the news of the purchase program being made public the same month. This program, also referred to as a 'tandem plan,' would pave the way for the larger Brooke-Cranston tandem program for the subsidized purchase of conventional mortgages by GNMA, which was authorized in October 1974 (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 83).[100]

In his May 10 statement about the plans and pending legislation to revitalize the housing market, President Nixon offered the following motivation for these policy changes: "*The higher cost of money affects all sectors of the economy, but none more directly than the housing market.* ***The Nation's housing industry****, which had been producing homes at record high rates in 1971, 1972, and 1973,* ***is now operating far below its potential***" (Nixon (1974)). He also noted that "*The conventional mortgage market normally does not require this type of Government support, but* ***present circumstances warrant these unusual measures***." These policy changes occurred in the midst of the recession lasting from November 1973 through March 1975, during a particularly acute mortgage credit crunch in 1974. The *CQ Almanac* explained that "*[t]he housing industry served as the whipping boy for many of the nation's economic ills in 1974. It was caught by the "double whammy" effects of inflation, which forced up the cost of its product, and tight monetary policy used to fight inflation, which dried up credit for the purchase of homes*" (CQ (1975b)). We thus classify the president's plan to revitalize the housing market as clearly cyclically motivated.

[100] Broadly speaking, the tandem plans refer to programs for the subsidized purchases of mortgages to support certain segments of the market during times of credit scarcity. See GNMA (Sec. 3.4.3) for an overview and chronology of the various tandem programs. Unlike GNMA, FHLMC was permitted to hold the mortgages it acquired for extended periods of time.

Under the Treasury-FHLB program, Freddie ultimately acquired $1.575 billion in conventional mortgage loans. The outstanding principal balance of the FHLBank advances to Freddie to fund the program was retired in 1976 and 1977, with the final payment made on February 25, 1977 (FHLMC Annual Report 1977, p. 23).

Housing and Community Development Act of 1974 (Pub. L. 93-383)

Enacted: August 22, 1974

See listing under FNMA (Sec. 3.4.1) for legislative and economic context.

Policy Change:	Conforming Loan Limit
Agency:	FHLMC
Impact:	+$0.46 billion
News:	Aug. 1974
Effective:	Aug. 1974
Classification:	Non-Cyclical

The limit on the outstanding balance of a conventional mortgage eligible for purchase by Fannie and Freddie was switched from the FHA Section 203(b) limit to the Section 5(c) limit for mortgages originated by insured S&Ls. The Act additionally raised the Section 5(c) limit from $45,000 to $55,000, which thus became the new conforming loan limit. The net increase was $22,000, from the standing $33,000 203(b) limit, which the Act also raised to $45,000. The reason for the change had more to do with the Freddie than with the Fannie (HUD (1987)). As the Senate Committee on Banking, Housing, and Urban Affairs report explained, it was "*not realistic to permit savings and loans to originate $45,000 mortgages and to restrict Freddie to the purchase of mortgages with a maximum principal mortgage tied to a varying FHA limit*" (Senate Committee on Banking (1974b),

p. 85). The change for Fannie apparently followed in order to roughly maintain parity between the GSEs (HUD (1987), p. 35). The Act also increased the limit on the Enterprises' holdings of conventional mortgages originated more than one year prior to purchase, from 10% to 20% of aggregate portfolio holdings.

The increase in the 5(c) limit was intended to "*help adjust the limit in line with the substantial increases that have occurred in recent years in the cost and value of single family homes, particularly in the nation's high-cost areas*" (House Committee on Banking and Currency (1974), p. 43). The House committee report stated that raising the Enterprises' loan limit from $33,000 to $55,0000 "*would permit FNMA to serve much the same housing market in terms of constant dollars as it was authorized to serve when the Emergency Home Finance Act was enacted [in July 1970]*" (House Committee on Banking and Currency (1974), p. 29). We accordingly score the conforming loan limit as keeping Fannie's net purchase activity in line with interim home price inflation, potentially increasing FNMA's retained portfolio by $1.14 billion, up 16.8% from the net purchase volume in the year before enactment (see listing under FNMA, Sec. 3.4.1).

But as Freddie's purchases only began in 1970Q4, the July 1970 enactment of Emergency Home Finance Act clearly does not work as a comparable benchmark for Freddie's portfolio activity, and the House, Senate, and conference committee reports accompanying the Housing and Community Development Act of 1974 offer no indication of the effect of conforming loan limit increases explicitly for Freddie. The increase in the loan limit for Fannie, however, was meant to maintain parity between the two GSEs, and both were operating in the same segment of the market. To quantify the impact of the conforming loan limit increase for Freddie, we thus apply the same 16.8% relative increase for

Fannie's net purchases to Freddie's portfolio activity. Freddie's net purchases were, however, far more volatile, given their prevailing business model focused solely on securitization, so we assume the Act would have increased Freddie's purchasing as measured by their retained portfolio instead of net purchases. Applying a 16.8% increase to Freddie's $2.7 billion average retained portfolio over 1973Q3 and 1974Q2, the year before the bill's enactment, implies a potential increase of $456 million. In practice, Freddie's mortgage portfolio increased from $3.1 billion in May 1974 to $4.9 billion in May 1975.

As with Fannie, we determine the news of the conforming loan limit policy change to have been made public in August 1974. And as with Fannie, we classify the policy change as unrelated to the business or financial cycle (see listing under FNMA, Sec. 3.4.1, for a discussion of legislative context and classification).

Emergency Home Purchase Assistance Act of 1974 (Pub. L. 93-449)
Enacted: October 18, 1974
See listing under GNMA (Sec. 3.4.3) for an overview of the Act and Brooke-Cranston Tandem program.

The Act established the Brooke-Cranston Tandem program, which granted the HUD Secretary powers to instruct GNMA to make subsidized purchases of conventional mortgages, as opposed to the FHA/VA mortgages to which its activity was otherwise restricted, to try to slow or stop declines in housing market activity. Eligible conventional mortgages were, however, limited to an 80% LTV ratio and $42,000 loan limit, well below the standing conforming loan limit. As Ginnie was statutorily required to deal in government-guaranteed mortgages, Fannie and Freddie served as agents of GNMA for its commitments and pur-

chases of below-market rate conventional mortgages, with each institution allocated roughly half of the funds for Ginnie's conventional purchases (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 14). As Freddie and Fannie were mere conduits and did not retain related purchases, we only consider the Brooke-Cranston Tandem program to be a significant policy change affecting Ginnie Mae (see listing under GNMA, Sec. 3.4.3).

Housing and Community Development Act of 1977 (Pub. L. 95-128)

Enacted: October 12, 1977

See listing under FNMA (Sec. 3.4.1) for legislative and economic context.

Policy Change:	Conforming Loan Limit
Agency:	FHLMC
Impact:	+$0.21 billion
News:	Oct. 1977
Effective:	Oct. 1977
Classification:	Non-Cyclical

The Act raised the conforming loan limit for conventional mortgages from $55,000 to $75,000, effective immediately. The conforming loan limit formula was revised to 125% of the S&Ls Section 5(c) limit, which was also revised upwards from $55,000 to $60,000. As with FNMA, we quantify the impact of the increase in FHLMC's conforming loan limit by assuming the change would restore Freddie's real portfolio activity back to volumes surrounding the August 1974 enactment of the Housing and Community Development Act of 1974, pursuant to the House and Senate Committee report language (see discussion in listing under FNMA, Sec. 3.4.1). Given their prevailing business model focused on pass-through securitization, Freddie's net purchases were, however, far more

volatile Fannie's, so we again quantify the Act as having increased Freddie's portfolio activity relative to its retained portfolio instead of net purchases.

The $3.04 billion average retained portfolio over 1973Q4 through 1974Q3 would have translated to $4.08 billion at the end of September 1977, adjusted for the 34.3% increase in OFHEO's seasonally adjusted Constant-Quality House Price Index for new homes sold over 1974Q3 and 1977Q3. Relative to Freddie's average $3.87 billion retained portfolio over 1976Q4 and 1977Q3, the year before enactment of the Housing and Community Development Act of 1977, this would have represented an increase of roughly $210 million. To the extent that the enacted provisions were meant to anticipate further near-term inflation, we view this as a conservative estimate.

As with Fannie, we determine the news of the conforming loan limit policy change to have been made public in October 1977. And as with Fannie, we classify the policy change as unrelated to the business or financial cycle (see listing under FNMA, Sec. 3.4.1, for a discussion of legislative context and classification).

Housing and Community Development Amendments of 1978 (Pub. L. 95-557)
Enacted: October 31, 1978

Policy Change:	Mortgagee Expansion
Agency:	FHLMC
Impact:	+$2.0 billion
News:	Oct. 1978
Effective:	May 1979
Classification:	Non-Cyclical

The Act amended the FHLMC Act to loosen restrictions and allow purchases from mortgage bankers, specifically "*any mortgagee approved by the Secretary of Housing and Urban Development for participation in any mortgage insurance program under the National Housing Act*" (Sec. 321(a)). In doing so, Congress also explicitly clarified and expanded its intent with respect to Freddie Mac's operations, rejecting market segmented roles for Fannie and Freddie. These amendments were scheduled to become effective on May 29, 1979 (two hundred ten days after enactment) unless FHLMC prescribed an earlier date, which it did not.

An accompanying House Banking Committee report made clear that the amendment was clarifying a long-standing question of whether mortgage brokers were eligible to service loans sold to Freddie, which had repeatedly surfaced before the committee. Confusion had been amplified by language in the conference report for the Housing and Community Development Act of 1974, which sanctioned limited servicing. Freddie's regulations did not explicitly rule out loan servicing by mortgage bankers, but its regulations were designed to be met by S&Ls, and de facto ruled out loan servicing by others (House Committee on Banking (1977a), p. 38). Freddie had submitted a report to Congress on January 31, 1978, proposing 'rules of the road' for responsibly authorizing mortgage bankers to directly sell loans to the corporation (Senate Committee on Banking, Housing and Urban Affairs (1978), p. 52). The House report explained that: "*Underlying this whole issue was a basic question of whether the Congress created FHLMC solely to assist only one segment of the mortgage lending industry, to provide a secondary market facility, to the exclusion of all other segments.* ***It is the position of the committee that this facility created by the Congress was to assist the housing markets generally and not one favored segment.*** *It has been stated that mortgage bankers have FNMA and savings and loans have FHLMC. The committee*

rejects that justification. ***These are entities created by Congress generally to assist the mortgage credit markets and not benefit just parts of it***" (House Committee on Banking (1977a), p. 39).

After the bill cleared both the House and Senate, the *Washington Post* reported that allowing mortgage bankers to sell to FHLMC "*could result in an additional* $2 *billion being recycled into the residential mortgage market by 1979*" (The Washington Post (5/13/1978)). Based on this projection, we assign an annualized increase in Freddie's purchase capacity of $2 billion for its first year of operation. Earlier versions of the bill had passed the House in June and the Senate in July, but the back-and-forth between House, Senate, and White House was particularly contentious and threatened to kill the bill. In an effort to reassert authority over an increasingly activist HUD, a House provision would have enabled a "legislative veto" over newly issued HUD regulations, which President Carter informed Congress the administration viewed as unconstitutional, and which the Senate rejected in its bill (CQ (1979)). It was only in conference that this House provision was dropped and the bill's passage seemed secured. The Senate agreed to the conference report on October 14 and the House followed suit a day later; correspondingly, we date the news of Freddie Mac's expanded mortgagee authorization as being made public in October 1978.

The Senate bill was the product of 11 hearings held between January and April 1978, and the bill enacted in October was the product of a slow and deliberate legislative process. The Act was focused on routine programatic authorizations and reforms aimed at longer-term housing policy objectives. The accompanying Senate committee report made no mention of housing starts, concerns about a recession, or other cyclical motives. The accompanying House

report characterized the economy as "*in its third year of recovery from the recession of 1975*," noting that construction unemployment was unusually low and housing starts were roughly unchanged from the previous year, although inflation and higher interest rates were projected to slightly dampen home sales and housing starts.[101] The overview of projected impacts of the bill stressed creating certain types of housing units, but in no way stressed boosting employment or overall housing starts. Moreover, the mortgagee expansion was intended to resolve a longstanding regulatory question and better advance Congress's original intent with respect to the creation of Freddie Mac. We thus classify the expansion of FHLMC-eligible mortgagees as clarifying past congressional intent and advancing longer-term policy objectives, while unrelated to the business or financial cycle.

Housing and Community Development Amendments of 1979 (Pub. L. 96-153)
Enacted: December 21, 1979

Policy Change:	Conforming Loan Limit
Agency:	FHLMC
Impact:	+$0.86 billion
News:	Dec. 1979
Effective:	Dec. 1979
Classification:	Cyclical

The Act amended the FHLMC Act to open purchase of Freddie's mortgages, mortgage securities, and obligations to any person trust or legally chartered organization, and granted Freddie's securities the same legal standing as US gov-

[101]The economic overview and discussion of inflation, housing, and the bill's likely impacts were included pursuant to Rule XI, Clause 2(1)(4) of the Rules of the House of Representatives, which required the committee make a statement regarding the inflationary impact of the bill. Hence the economic overview was not motivated by bill-specific cyclical economic concerns.

ernment securities, up to a sunset of June 30, 1985.[102] FHLMC's charter was also amended to make its securities and obligations legal collateral, including for public deposits. And the Act newly allowed Freddie to purchase liens and interests in housing cooperatives. The committee report accompanying the House bill, where the amendments to Freddie's charter originated, explained that they were "*intended to assure a broader market for the Corporation's securities*" (House Committee on Banking (1979a), p. 26).

The Act also raised the conforming loan limit for conventional mortgages from $75,000 to $93,750 by increasing the benchmark savings and loans Section 5(c) single-family mortgage limit from $60,000 to $75,000, effective immediately. Regarding the 5(c) limit, the committee report accompanying the Senate bill explained that "*[b]ecause home prices have escalated 20 to 25 percent in the past 2 years, the committee believes that the $60,000 limit has become obsolete and is severely restricting the ability of thrifts to meet the borrowing amounts requested by today's home buying public*" and that increasing that limit to $75,000 was meant to "*reflect inflation in home prices (and increase in mortgage size) since last amended in 1977*" (Senate Committee on Banking, Housing and Urban Affairs (1979), p. 20). In explaining similar increases in the FHA 203(b) limits, the Senate report similarly noted that median home sales prices had jumped roughly 30% since limits had last been increased by the Housing and Community Development Act of 1977 (see above), and that the FHA's market share had dropped from roughly 15% to 5% because loan limits had not kept up with inflation or the market (Senate Committee on Banking, Housing and Urban Affairs (1979), p. 14).

[102] More specifically, the amendment established that: "*Where State law limits the purchase, holding, or investment in obligations issued by the United States by such a person, trust, or organization, such Corporation mortgages, obligations, and other securities shall such Corporation mortgages, obligations, and other securities shall be considered to be obligations issued by the United States for purposes of the limitation*" (Pub. L. 96-153, Sec. 316(a)).

To quantify the impact of the increase in FHLMC's conforming loan limit, we assume, pursuant to the Senate Committee report language, that the change would restore Freddie's retained portfolio activity to that proximate to the October 1977 enactment of the Housing and Community Development Act of 1977 (see above).[103] The $3.40 billion average portfolio over 1977Q1 through 1977Q4 would have translated to $4.27 billion at the end of September 1979, adjusted for the 25.5% increase in OFHEO's seasonally adjusted Constant-Quality House Price Index for new homes sold over 1977Q4 and 1979Q3; relative to an average portfolio of $3.41 billion over 1978Q4 to 1979Q3, this would imply an annualized portfolio increase of $857 million, which we assign to the year starting December 1979. In practice, Freddie's portfolio grew from $3.9 billion in December 1979 to $5.0 billion in December 1980.

Versions of the bill were introduced in both chambers in mid-May, passed the House in early June, and passed the Senate in mid-July, but there were substantive differences between the two bills—including over the 5(c) loan limit. The Senate bill proposed raising the single family loan limit from $60,000 to $75,000, whereas the House bill proposed no change (House Committee on Banking (1979b), p. 73). The loan limit increase won out in the conference report, which the Senate agreed to on December 18, followed by the House the next day. Because of this legislative uncertainty over the policy change at hand, we determine that credible news of Freddie Mac's conforming loan limit was made public only in December 1979, when the conference bill was agreed upon.

While the Act was signed into law shortly before the economy slipped into the recession of January through July 1980, the accompanying House committee

[103]Given their prevailing business model focused on pass-through securitization, Freddie's net purchases remained far more volatile Fannie's, so we again score the Act as having increased Freddie's portfolio activity on a retained portfolio basis instead of net purchases.

report emphasized that the bill took "*account of the specter of inflation and the need for fiscal restraint... and the need to mitigate housing inflation*" (House Committee on Banking (1979a), pp. 3–4). The Annual Report of the Federal Reserve Board for 1979 noted that housing starts had fallen sharply during the end of the year, as financial conditions tightened and thrifts' deposit growth slowed (Annual Report of the Federal Reserve Board 1979, pp. 5, 7). Unlike the longer legislative horizon and policy scope of the Housing and Community Development Acts of 1974 and 1977, the Amendments of 1979 were passed in shorter order, and during the credit crunch that lasted from 1978Q2 through 1981Q4. We therefore classify this policy change as cyclically motivated.

Housing and Community Development Act of 1980 (Pub. L. 96-399)
Enacted: October 8, 1980

The Act instituted a formulaic peg for annually adjusting the conforming loan limit, which was tied to home prices. The formula maintained the standing benchmark loan limit of $93,750 for 1980 and was a continuation of current policy, so we do not consider subsequent changes based on the home price indexation formula to be significant policy changes, because they would have been both anticipated and a continuation of current policy. The new formula had the effect of setting the conforming loan limit at $98,500 effective January 1, 1981. See listing under FNMA (Sec. 3.4.1).

Adjustable-Rate Mortgage Program
Announced: May 28, 1981

Policy Change:	ARM Program Approval
Agency:	FHLMC
Impact:	+$0.367 billion
News:	May 1981
Effective:	July 1981
Classification:	Cyclical

The FHLBB had approved FHLMC to launch a secondary market program for variable-rate mortgages on July 1, 1979 (The American Banker (5/14/1980)). In a speech in July 1979, FHLMC President Philip Brinkerhoff announced that Freddie was gearing up to launch a secondary market for graduated payment mortgages (GPMs) and variable rate mortgages in 1980, and stated that "*during the first 18 months of the program, [Freddie] expected to buy from $500 million to $600 million worth of the [GPM] mortgages*" (The American Banker (7/16/1979)); the timing of the ARM program's launch, however, was rather uncertain given complications in standardizing documents meeting various state requirements. In May 1980, FHLMC announced that in addition to developing a GPM secondary market it was also developing standardizing documents for three-to-five year renegotiable-rate mortgages (RRMs), and intended to launch a secondary market for RRMs by December. In November 1980, FHLMC began sending standardized ARM origination documents to mortgagees in preparation to launch a secondary market for ARMs in 1981 (The American Banker (11/21/1980)).

As Freddie was developing documentation for an ARM program, the supply of ARM originations in the primary market was an impediment to launching a program. Primary market deregulation only effectively authorized ARM issuance in early 1981, with the FHLBB authorizing Federal S&Ls to issue ARMs

and variable-rate mortgage insurance on April 21, 1981 (46 FR 24148), which effectively opened the door to FHLMC implementing a program; the OCC and NCUA also approved various ARM programs and lifted impeding interest rate restrictions imposed on federally chartered banks and thrifts around the same time (see FNMA, Sec. 3.4.1). Without established secondary market support, however, mortgagees were initially hesitant to issue ARMs, and there was little issuance until Fannie and Freddie unveiled their secondary purchase program guidelines (Fannie launched an ARM program of its own a month after Freddie).[104] Because secondary market entry into ARMs was de facto set in motion immediately following deregulation of the primary mortgage market and was necessary for mortgagees to issue ARMs, we consider entry into ARMs by Fannie and Freddie as driven by US federal housing credit policy regulatory changes.

FHLMC announced on May 28, 1981 that it would begin a pilot program purchasing ARMs on July 1, 1981. At the press conference, an FHMLC official said that the purchasing program would initially be funded through debt financing. He added that the program would probably borrow no more than $1 billion, and then would offer participation certificates (The American Banker (5/29/1981)). Taking the midpoint estimate of $550 million from Brinkerhoff's projected GPM purchase volume around the same time as a proxy for entry into this new market, we assign an annualized increase in purchase capacity of $367 million ($\frac{\$500+\$600}{2} \times \frac{12}{18}$ =$367) dated to the year stating May 1981, given the considerable and long-standing uncertainty about the timing of the program's launch and requisite issuance approval for primary market originations.

[104]FHLMC's 1981 Annual Report explained the "*creation of a secondary market for adjustable rate mortgages enabled lenders to initiate ARM programs, secure in the knowledge that the mortgages could be sold*" (FHLMC Annual Report 1981, p. 15).

The program expansion into ARMs was made in an environment of heightened interest rate risk and depressed earnings resulting from monetary tightening, and the program took effect in the midst of the credit crunch persisting from 1978Q2 through 1981Q4. Moreover, the ARM program and broader deregulatory movement favoring ARMs was intended to help mortgage lenders better manage interest rate risk in the prevailing economic context. Freddie's Annual Report for 1981 explained that the FHLBB's approval of ARMs in the primary market was explicitly motivated by elevated funding costs and heightened interest rate risk: "*Early in 1981 traditional mortgage lenders realized they could no longer afford solely to make 30-year loans with fixed interest rates while the interest rates they paid to borrow short term funds continued to rise. The [FHLBB] responded by issuing regulations in April which permitted federal savings and loans to originate mortgage loans with adjustable rates. The adjustable mortgage allows lenders the advantage of adjusting upwards the rates on loans in their portfolio to protect them when their cost of funds goes up. The Mortgage Corporation acted by developing and introducing its own [ARM] program for lenders*" (FHLMC Annual Report, pp. 14–15). Consequently we classify the ARM program's approval and launch as cyclically motivated, as we classify Fannie's program expansion into ARMs in June 1981 (see FNMA, Sec. 3.4.1).

Mortgage Purchase Amendments of 1981 (Pub. L. 97-110)

Enacted: December 26, 1981

In May 1981, FHLMC had announced that it was preparing to request authorization from Congress to launch a new program guaranteeing pools of securities backed by conventional mortgages, which it planned to submit in July (The American Banker (5/7/1981)). The program was to more closely resemble Gin-

nie Mae's guarantees of securities backed by FHA/VA mortgages. Because its "*current level of capital [was] not sufficient to support a large guarantor business*," Freddie officials noted that it would also "*seek authorization to issue dividend-bearing stock that would be purchased by institutions participating in the guarantor program*" (The American Banker (5/7/1981)).

Congress opted for a more marginal deregulatory expansion into the conventional market and did not address Freddie's concerns about capital adequacy for supporting expanded secondary market operations, an early example of Freddie's greater constraints in raising capital holding back its portfolio relative to that of Fannie. In December, the Mortgage Purchase Amendments of 1981 removed the portfolio limitations on FNMA and FHLMC holdings of conventional mortgages over one year old when purchased, which were previously limited to 20% of holdings. Mortgages over one year old could only be purchased, however, from the FDIC, FSLIC, NCUA, or other sellers currently engaged in mortgage lending or investing activities. The Act also prohibited FHLMC from imposing any fee or charge upon an eligible seller differing from that imposed upon FHLBank members. Shortly after passage, FHLMC's board eliminated the fee charged to non-FHLBS member mortgagees (HUD (1983)).

Regardless of Congressional inaction regarding its capitalization, Freddie launched its Guarantor Program in August 1981, under which Freddie would purchase whole loans from thrifts and immediately sell back interests in PCs backed by those mortgages, providing struggling thrifts with a far more liquid asset (HUD (1983), p. 15). Freddie had made commitments to purchase more than $5.5 billion in mortgages and exchange them for PCs by the end of the year. The program was an "*instant success*" with over $25 billion in mortgages

exchanged under the Guarantor Program in 1982 alone, leading to a rapid expansion of Freddie's aggregate PC issuance (Hu (2011), p 88, HUD (1983), p. 16).

Preferred Stock Authorization (Pub. L. 97-289)

Enacted: October 6, 1982

While the FHLBB imposed no statutory leverage or capital requirement on Freddie, their regulator kept mortgage holdings and operations aligned with what they deemed prudent capitalization. In 1981, FHLMC and FHLBB had concluded that Freddie was adequately capitalized for current operations, but had insufficient capital to safely expand operations, and needed to raise more equity than the $100 million provided by the FHLBanks pursuant to the Charter Act (HUD (1983), p. 15). Freddie's capital base was $430 million as of July 1981 (The Washington Post (7/13/1981)). In late 1981, Freddie found congressional sponsors to introduce legislation that would recharter and recapitalize the organization, notably by allowing it to issue preferred stock. Freddie was proposing to convert its nonvoting common stock to voting shares and become a privately held, tax-paying entity while retaining a $200 million line of credit with the FHLBB—what it considered parity with Fannie's Treasury backstop. But the proposal met substantial opposition in Congress and from the Reagan administration, which thought the bill did not go far enough toward full privatization.

On October 6, 1982, Pub. L. 97-289 amended the FHLMC Act to allow Freddie to issue preferred stock at the discretion of the Board of Directors, provided that such stock did not change the status of the nonvoting common stock previously issued. In December 1984, the FHLBB approved a FHLMC dividend in the

form of 15 million shares of preferred stock, pro-rated to the FHLBanks by each district's share of the initial $100 million common stock capitalization (National Mortgage News (1/7/1985)). The market valuation was quoted at roughly $600 million, although FHLMC said it would only show a transfer on its balance sheet at the book value of $150 million. Preferred shareholders would receive the first $10 million in FHLMC's annual dividends, and 90% of all additional dividends. The FHLBanks subsequently transferred FHLMC's preferred stock dividends as a dividend to their member institution shareholders. The timing of the dividend was motivated by the imminent repeal of Freddie's federal tax exemption, effective January 1, 1985 (Pub. L. 98-369, see below). Restrictions were placed on the preferred stock so that it could only be traded among member institutions, each subject to a 1% ownership limitation (Treasury (1990), p. B-9).

This decision allowed thrifts to recognize a substantial portion of the value of Freddie Mac's stock, which they indirectly owned through the FHLBanks, thereby shoring up their balance sheets. The transfer was estimated to inject $600 million in previously unrecognized capital to FHLBank members; while a 'positive' development, analysts noted that the transfer of profits from FHLMC to thrift institutions would 'only marginally' improve the industry's beleaguered balance sheets (The American Banker (12/11/1984)). Because Freddie's preferred stock issuance took the form of a dividend payment, we assign no impact on its retained portfolio, as it did not raise any working capital.

This passthrough issue of preferred stock was quickly challenged by OMB, however, which requested a probe by the Department of Justice on the basis that the preferred shares were functioning as common shares, because the re-

maining 10% of dividends above $10 million would also be transferred to the thrifts owning preferred shares. The Justice Department, however, unequivocally ruled in favor of FHLMC and the FHLBB in a letter dated January 25, 1985 (Department of Justice (1985)). Preferred shares began trading on the NYSE on January 23, albeit with the caveat that only members of the FHLBS could purchase shares. By December 1985, the FHLMC advisory committee had voted unanimously to seek approval to repeal the restriction on trading, in large part to improve market liquidity and boost the price of shares (National Mortgage News (12/23/1985)). Broadening the base for ownership was also seen as a step toward public listing and full privatization, a long-standing priority for the Reagan administration.

Joint Resolution of Congress (Pub. L. 98-35)

Enacted: May 26, 1983

In May 1983, President Reagan signed into law a Joint Resolution of Congress clarifying, among other things, that all securities issued or guaranteed Freddie Mac were exempt from SEC securities regulations, "*to the same extent as securities that are direct obligations of or obligations guaranteed as to principal or interest by the United States*" (Sec. 5), save guaranteed securities backed with mortgages it had not purchased outright.

Deficit Reduction Act of 1984 (Pub. L. 98-369)

Enacted June 27, 1984

Under the provisos of the Act, Freddie became subject to federal income taxes, effective January 1, 1985. The Joint Committee on Taxation (JCT) explained that "*[t]he tax exemption for Freddie Mac was originally intended to allow the*

corporation to accumulate adequate capital so that it could compete against other entities in the secondary mortgage market, including Fannie Mae, which is a taxable entity. The purpose of this tax exemption was not to provide Freddie Mac with a competitive advantage. In the past 14 years, Freddie Mac has become highly profitable and has accumulated sufficient capital to compete in the secondary mortgage market. As a result, Congress believed that the exemption from tax had fulfilled its function and had begun to provide Freddie Mac with a competitive advantage. Accordingly, Congress believed it appropriate to repeal the tax exemption for Freddie Mac" (JCT (1984), p. 551). Thrifts, however, were granted a tax deduction for FHLBank dividends allocated from previously taxed FHLMC income, thereby avoiding double corporate taxation. Freddie was also granted a net operating loss carryback provision.

JCT estimated that the repeal of FHLMC's tax exemption and related tax adjustments would, on net, increase federal receipts by $67 million in FY1985, $109 million in FY1986, and $142 million in FY1987 (JCT (1984), p. 551). These estimates imply roughly $94.25 million in net earnings otherwise on balance sheet that would be transferred to the Treasury in calendar year 1985.[105] Freddie Mac made $164 million in income tax provisions for 1985, reducing net income to $208 million, down from $267 million in 1984 (FHLMC Annual Report 1985, p. 10). We assume this new tax liability would have been too small to have necessitated significant related portfolio reductions, particularly given the lack of explicit leverage requirements.

Secondary Mortgage Market Enhancement Act of 1984 (Pub. L. 98-440)
Enacted: October 3, 1984

The Act temporarily authorized FHLMC to purchase second mortgages for

[105]Calculations assume a 75-25 FY-CY split.

the first time, and renewed Fannie's prior authorization to do so; this authorization was extended several times before being made permanent by the Housing and Community Development Act of 1987 (Pub. L. 100-242). Enabling this authorization, the Act amended the definition of mortgage in the FHLMC Act to include subordinated liens. FHLMC was also prohibited from guaranteeing MBS backed by mortgages not purchased outright by the corporation.[106] And the Act clarified that the permissible maximum for loan purchases by FHLMC (and FNMA) applied to the full original principal, even if only a participation were purchased—intended to keep the GSEs out of the jumbo mortgage securitization market. See listing under FNMA (Sec. 3.4.1) for further discussion.

Second Mortgage Purchase Program

Announced: January 7, 1986

Policy Change:	Second Mortgage Program Approval
Agency:	FHLMC
Impact:	+$1.0 billion
News:	Jan. 1986
Effective:	Jan. 1986
Classification:	Non-Cyclical

On January 7, 1986, Freddie Mac announced that it would be launching a new program to purchase second mortgages, and that a second mortgage securitization program would begin once a sufficient number of liens had been inventoried on portfolio (Dow Jones News Service (1/6/1986)).[107] Freddie noted

[106]Ginnie Mae's securitization model involved guaranteeing the timely and full payment on qualified issuers' pools of FHA/VA mortgages that were never purchased outright by Ginnie; the amendment prohibited Freddie from adopting this model.

[107]Fannie had started a second mortgage purchase program in 1981, under which it had purchased $5 billion in second mortgages to date, but was retaining second mortgages on portfolio

that purchases would begin in January and after accumulating an initial $500 million in loans, it would begin issuing second mortgage pass-through securities, with the first issuance expected by early 1987 (The American Banker (1/8/1986)). Freddie Mac's acting vice president for sales and marketing projected that the corporation would purchase roughly $1 billion worth of second mortgages during calendar year 1986 (National Mortgage News (1/13/1986)). As this programatic expansion was enabled by recent statutory authorization (see above), we consider this a significant regulatory policy change, and assign an annualized increase in purchase capacity of $1 billion for its first year of operation. As the timing of such a program's launch was entirely uncertain, and no earlier concrete announcement or leak could be found, we determine that the news of the second mortgage program was made public in January 1986.

In proposing second mortgage authorization for Freddie, a Senate report accompanying the Secondary Mortgage Market Enhancement Act of 1984 explained that "*[t]he committee considers this amendment to be consistent with the established mission of both Fannie Mae and Freddie Mac to foster a nation-wide system of home finance. Second mortgages are becoming an increasingly important source of financing for homeownership... the Committee bill would help ensure that there is an adequate secondary market for subordinate loans that are used for the specific purposes of purchasing or refinancing homes*" (Senate Committee on Banking, Housing and Urban Affairs (1983), p. 13).

Freddie's 1986 Annual Report explained that its intent was "*to provide billions of dollars in housing equity for home owners and provide new opportunities for mortgage lenders who originate second mortgage loans*" and characterized the program

(see FNMA, Sec. 3.4.1). A HUD ruling had provided authority for Fannie to deal in second mortgages in 1981, before enactment of Pub. L. 98-440 expanded statutory authority to FHLMC (see above).

expansion as expanding its 'product line' (FHLMC Annual Report 1986, pp. 3, 23). That report also described the prevailing economic and mortgage market environment as a period of "*favorable market conditions*." The economy was neither in a recession nor credit crunch, and the Federal Reserve characterized the housing and mortgage markets as healthy: "*Housing activity continued to expand in 1986. Total housing starts edged up to 1.8 million units for the year as a whole, their highest level since the late 1970s. Single-family homebuilding increased about 10 percent, bolstered not only by a sizable decline in mortgage rates—which brought rates on fixed-rate loans back to single digits for the first time since 1978—but also by continuing favorable demographic trends*" (Annual Report of the Federal Reserve Board 1986, p. 9). Given Congress's intent to modernize the structure of secondary mortgage finance, the protracted delay between's FHLMC's authorization and announced program launch, and Freddie's business diversification motive for the program expansion, we classify the program expansion into second mortgages as unrelated to the business or financial sector.[108]

Purchase Cap

Announced: March 3, 1987

In early March 1987, FHLBB Chairman Edwin Gray announced that the regulator would limit Freddie Mac's mortgage purchases to $75 billion for the year, a reduction relative to the corporation's record $103 billion worth of conventional mortgage purchases in 1986, which had been driven by record refinancing activity as interest rates subsided (The Bond Buyer (3/9/1987)). Freddie had previously projected in its budgetary request that it would purchase $75 billion worth of mortgages for the year, which the Board then adopted as its purchase

[108]Fannie's first authorization into second mortgages in 1981, on the other hand, was an explicit response to cyclical conditions in the mortgage market, and authority was to be rescinded after interest rates were projected to have receded (see Sec. 3.4.1).

limit—the first in Freddie's history (The Bond Buyer (9/15/1987)). The Board sent Freddie a letter dated March 3 instructing it to develop a plan detailing how the $75 billion maximum would be attained. After news of the purchase cap broke, Freddie's acting president downplayed the cap as "*a flexible one and [that it] might be raised if necessary*" (The American Banker (3/10/1987)).

In announcing the purchase cap, the Board cited concerns about S&Ls' holdings and hedging use of certain 'Freddie Mac products,' notably floating-rate CMOs. Chairman Gray had also recently raised concerns that Freddie's market dominance was hurting thrifts' ability to raise funds in capital markets (The American Banker (3/10/1987)). But market analysts attributed the move as largely motivated by Gray's desire to reduce Freddie's activity in the secondary mortgage market, and as acting on behalf of the Reagan administration to circumvent Congress in reining in the Enterprises (The American Banker (3/10/1987)).

On September 14, Freddie Mac President and CEO Leland Brendsel announced that the Board had lifted the cap on purchases, and projected that Freddie's purchases would total $85 billion for the year (The Bond Buyer (9/15/1987)). Brendsel had hinted the week before that the Board was interested in lifting the limit, and predicted it would be lifted by year's end. According to a Freddie spokesperson, altered "*market conditions have convinced the Bank Board to rescind the limit*" (The Bond Buyer (9/15/1987)). Interest rates were rising, decreasing refinancing activity and increasing demand for ARMs, and Freddie pledged to increase support of the secondary AMR market. The $75 billion purchase cap does not appear intended or projected to be a binding constraint ex ante, and it certainly was not binding ex post, though its slack

nature appears somewhat cyclically motivated by credit market conditions. We thus do not classify the temporary purchase cap as a significant regulatory event affecting Freddie's mortgage holdings.

REMICs Authorization

Authorized: February 1988

In February 1988, FHLMC sought and received permission from the FHLBB to issue REMICs. The temporary authority granted permitted the issuance of $15 billion in REMICs and other long-term debt between February 1988 and September 1989. Over the course of 1988, Freddie Mac sold nearly $13 billion in Multiclass PCs as REMICs (FHLMC Annual Report 1988, p. 3). We do not consider this authorization a significant regulatory affecting FHLMC's purchases of mortgages or MBS because the development of the REMIC market largely resulted in the re-securitization of outstanding agency MBS (see discussion under FNMA, Sec. 3.4.1).

Public Listing of Freddie Mac

Effective: January 3, 1989

Policy Change:	Stock Split Capitalization
Agency:	FHLMC
Impact:	+$1.62 billion
News:	Nov. 1988
Effective:	Nov. 1988
Classification:	Non-Cyclical

In July 1988, Senator Al D'Amato introduced a bill that would have removed barriers to trading Freddie's preferred stock and opened purchases to

the public, which was seen as both a means to improving the balance sheets of the thrifts holding the shares and a step toward privatization (The New York Times (6/7/1988)). Precluding Congressional action, Freddie Mac's Board of Directors—still comprised of the FHLBB—-decided in July to remove the trading restrictions on the preferred stock, opening ownership to public investors for the first time. In conjunction with the Board's decision, Freddie Mac offered to exchange each share of original preferred stock, along with a $7 per share capital contribution, for four shares of new senior participating preferred stock (Treasury (1990), p. B-9). The status of the non-voting, non-tradable common stock held by the twelve FHLBanks would remain unchanged.

The split offer, however, would be void without at least two-thirds of existing preferred shares being tendered, and thrifts faced a November 30 deadline to agree to exchange their shares in the split. If the deal was tendered, thrifts would able to realize a capital gain on their undervalued stock, which at the time of announcement, was projected to free $1 billion of new funds for the S&L industry, which had seen its capital levels diminish considerably over the previous few years (The New York Times (7/14/1988)). Within a week of the November deadline, a majority of thrifts had yet to exchange their shares, as they were delaying the $7 per share payment until the last possible minute to preserve cash (The American Banker (11/22/1988)). But in the end, nearly all of the thrifts' preferred stock was exchanged in the split, the cash contributions from which added $104 million to Freddie's capital base (Treasury (1990), p. B-9). Because Freddie's increase in paid in capital was contingent upon meeting the two-thirds tender threshold at the eleventh hour, we determine that the news of the capitalization was only made public in November 1989. Preferred shares began publicly trading on January 3, 1989.

While the FHLBB imposed no explicit statutory leverage or capital requirement on Freddie, their regulator kept mortgage holdings and operations aligned with what they deemed prudent capitalization, and portfolio expansion had been curbed earlier in the decade until more capital was raised (see Preferred Stock Authorization (Pub. L. 97-289) above). Assuming FHLMC's Board was keeping operations roughly in line with the 14.6-to-1 ratio of total liabilities on balance sheet to the primary capital base of $1.516 billion in 1987, the addition of $104 million in paid in capital would have enabled an increase in liabilities and purchases of $1.62 billion ($104 million × (14.6 +1) = $1.62 billion).[109] The ratio of total liabilities to the primary capital base was a comparable 16.3-to-1 and 15.4-to-1 in 1986 and 1988, respectively (FHLMC 1988 Annual Report, p. 24). And Freddie's primary capital base had risen to $1.976 billion by the close of 1988, after the paid in capital increase, up 30.3% from 1987—well above either the 23.1% increase in the prior year or average increase over the prior three years.

The Federal Reserve's Annual Report for 1988 noted that the "*spread between interest rates on fixed-rate mortgages, which have an average life of roughly 10 years, and yields on 10-year Treasury notes did not change appreciably over 1988, which also indicates that the mortgage markets continued functioning well despite the problems of many savings and loan associations*" (Annual Report of the Federal Reserve 1988, p. 17). The report also noted that housing investment had picked up in the second half of the year, and was up in the year to 1988Q4 (Annual Report of the

[109]The primary capital base was defined as reserve losses on mortgages, participating preferred stock, voting and nonvoting common stock, retained earnings, and additional paid in capital, but excluding subordinated borrowings. Alternatively using the ratio of liabilities to stockholder's equity of 20.72 at the end of 1987 (Treasury (1990), p. B-8), the implied maximum growth in mortgage assets from this capital injection would be $2.26 billion ($104 million × (20.72 +1) = $2.258 billion). A comparable ratio of liabilities to stockholder's equity of 20.69 prevailed at the end of 1988.

Federal Reserve Board 1988, p. 7). We classify the policy change as motivated by political preferences for privatization as well as addressing a long-standing, widely acknowledged constraint imposed by Freddie's statutorily restricted access to equity, and unrelated to the business or financial cycle.

Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (Pub. L. 101-73)

Enacted: August 9, 1989.

See listing under FNMA (Sec. 3.4.1) for a broader overview of the Act and its context.

FIRREA rechartered Freddie and, for the first time, set its statutory purpose: "*(1) to provide stability in the secondary market for home mortgages; (2) to respond appropriately to the private capital markets; and (3) to provide ongoing assistance to the secondary market for home mortgages (including mortgages securing housing for low- and moderate-income families involving a reasonable economic return to the corporation) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for home mortgage financing*" (Sec. 731a). Freddie's mission had not previously extended to explicitly supporting housing for low- and moderate-income families. Congress simultaneously made conforming changes to the FNMA Charter Act, so that the Fannie and Freddie had identical statutory purposes. Of particular note, Congress's emphasis for both GSEs shifted to 'ongoing assistance' to the secondary market, signaling a continuous presence in the secondary mortgage market.

The Act turned FHLMC into a fully publicly traded shareholder-owned corporation. The law automatically converted Freddie Mac's senior participating

preferred stock into voting, freely transferable common stock, effective August 9, 1989. Common stock began trading on the NYSE the following day. The conversion did not affect Freddie Mac's capitalization. The old Board of Directors, which consisted of the FHLBB members, was dissolved and replaced by a new 18-person Board of Directors, five of whom were to be appointed by the President and the remainder of whom would be elected by the voting common shareholders.[110] In harmonizing the special privileges and statutory treatment of Fannie and Freddie, the Act additionally amended Section 306(c) of the FHLMC Act to allow the Treasury Secretary to purchase up to $2.25 billion worth of Freddie Mac's obligations. As with Fannie, this statutory line of credit was perceived as an implicit government guarantee, lowering Freddie's cost of funds.

FIRREA transferred regulatory oversight of FHLMC from the FHLBB, which was also disbanded by the Act, to HUD, whose regulatory authority over Freddie was similar to its existing authority over Fannie. HUD could determine the ratio of unsecured debt to total regulatory capital, which was statutorily set to no less then 15-to-1, and could require that a reasonable portion of Freddie's mortgage purchases be related to national housing goals, providing they allowed for a 'reasonable' economic return to Freddie. As was the case for Fannie, regulatory capital included subordinated debt. In 1989, Freddie's debt-to-capital ratio was only 4.25-to-1; only a small volume of Freddie's assets were funded by unsecured debt and the capital ratio calculation excluded PCs held by third parties, treated as off-balance sheet securities. The Act additionally required HUD's approval for the issuance of stock and securities convertible into stock.

[110] An interim Board consisting of the President of the Corporation, outgoing FHLBB Chairman, and HUD Secretary were to serve until the first meeting of voting common shareholders.

It was clear that HUD's capital requirement did not constrain Freddie in any way (Treasury (1990), p. B-60). We therefore do not classify the imposition of this leverage requirement as a binding, significant policy change materially affecting Freddie's mortgage portfolio when FIRREA was enacted. The change in ownership structure in 1989, however, created strong profit incentives to exploit the advantages of government sponsorship and a perceived implicit guarantee through leveraged portfolio growth (Treasury (1996), p. 39). Prior to FIRREA, Freddie maintained a relatively small amount of mortgages in portfolio, primarily held for pooling inventory purposes, and securitized almost all of its purchases. As it was indirectly owned by the thrifts, this sufficed to accomplish the mission of providing secondary market liquidity. On February 6, 1990, one of the first actions taken by the new Board was to retire at par the nonvoting common stock held by the FHLBanks, further severing Freddie's ties with the FHLBS (FHLMC Annual Report 1990, p. 44, Treasury (1990), p. B-9). The business models of Fannie and Freddie subsequently converged towards expanding securitization fee income coupled with highly leveraged retained portfolio growth.

Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (Pub. L. 102-550)

Enacted: October 28, 1992.

See listing under FNMA (Sec. 3.4.1) for a broader overview of the Act and its context.

Policy Change:	Affordable Housing Goals
Agency:	FHLMC
Impact:	+$0.75 billion
News:	July 1991
Effective:	Jan. 1993
Classification:	Non-Cyclical

The Act created OFHEO as the safety and soundness regulator of Fannie and Freddie, imposed uniform capital requirements, and broadened the Enterprises' statements of purpose to expand affordable housing activities. FHLMC's charter was changed from providing stability in secondary market for 'home' mortgages to 'residential' mortgages, thus expanding emphasis on (lower-income) multifamily housing. One of the main provisions of FHEFSSA affecting Fannie and Freddie was the introduction new capital requirements and requirement that OFHEO develop of risk-based capital standards based on stress tests. As with Fannie, Freddie anticipated the new capital requirements (see discussion under FNMA, Sec. 3.4.1). For instance, Freddie's 1990 Annual Report stated that "*Congress and certain federal agencies are considering actions that could result in the imposition of capital standards and other regulatory requirements on Freddie Mac. Legislation may be enacted or regulatory requirements may be adopted in 1991*" (FHLMC Annual Report 1990, p. 24). But regulators had deemed that Freddie's capital position was significantly stronger than Fannie's, and unlike FNMA, there was no discernible effort by FHLMC to increase its capitalization in anticipation of pending regulations.

HUD had not previously extended national housing goals to Freddie Mac (GAO (1996), p. 82), but the Act introduced quantitative affordable housing

goals for Freddie. As mission regulator, HUD was required to set goals for: (1) low- and moderate-income housing; (2) housing in central cities rural areas and other underserved areas; and (3) special affordable housing for low- and very low-income families. During a two-year transition period starting from enactment, FHEFSSA set interim targets for each of the first two goals equal to 30% of the total number of units financed. Thereafter the HUD Secretary was authorized to set annual goals. Under the additional special affordable housing goal, Freddie was obliged to purchase an additional $1.5 billion of mortgages financing housing for low- and very-low income families over 1993–1994, split between single and multifamily housing loans. Given that Freddie had completely stopped purchasing multifamily mortgages in 1989, these affordable housing goals clearly would have been a binding constraint.[111] Splitting the $1.5 billion goal equally between the two years, we assign an annualized increase of $750 million to Freddie's purchase activity from the imposition of new affordable housing goals. As with Fannie, we classify this policy change as non-cyclically motivated (see discussion under FNMA, Sec. 3.4.1).

The special affordable housing goals enacted in October 1992 and made effective in January 1993, however, had long been anticipated, and were backed by both Fannie and Freddie in July 1991, when the GSEs negotiated them with housing public interest groups (see discussion under FNMA, Sec. 3.4.1). The original bill that evolved into FHEFSSA, which first introduced statutory affordable housing goals as a percentage of paid dividends, was introduced in the House on July 16, 1991, and the preferred $1.5 billion transition compromise

[111] It had become clear by the end of 1989 that Freddie's multifamily mortgage portfolio's credit performance was in bad and deteriorating shape, and these loans started to raise red flags, despite accounting for just 3% of its total servicing portfolio. After first tightening underwriting standards, multifamily mortgage purchases under its Multifamily Cash Program were completely suspended in September 1990 (FHLMC Annual Report 1990, pp. 18–19).

for Freddie was substituted in during a subcommittee markup on July 30. In response to the introduction and early evolution of the GSE oversight bill, Freddie's common shares fell 1.7% on July 16, 1991, for a negative excess return of 1.5 percentage points below the S&P 500 for the day. This movement reversed around the subcommittee markup, with Freddie's shares rising 1.8% on July 30 and 3.3% on July 31, for excess returns of 0.8 percentage points and 3.0 percentage points, respectively. We thus date the news of the transition affordable housing goals to July 1991, well in advance of taking effect.

HUD published slightly revised interim housing goals for FHLMC in July 1993, which were published essentially unchanged as a final rule on October 13, 1993. The special affordable housing goal was set at $1.5 billion above Freddie Mac's existing performance and commitments for 1993–1994, hence a change from current policy. Freddie Mac's goals were set lower than Fannie Mae's, again because it had ceased purchasing multifamily mortgages a few years earlier, and was thus equipped to finance fewer of those units than Fannie Mae.[112] Freddie Mac estimated that it purchased $5.214 billion of mortgages in 1992 that would have qualified toward the special affordable housing goal, had it applied. The 1993–1994 special affordable housing goal for Freddie Mac was then established as twice the 1992 baseline ($10.428 billion) plus $1.5 billion, for a two-year goal of $11.928 billion (58 FR 53072).

On November 30, 1994, HUD temporarily extended the affordable housing goals for 1994 into 1995. The 1995 goal for special affordable housing purchases for Freddie Mac was set at $3.357 billion for 1995, $750 million above the revised baseline (59 FR 61504). The lower special affordable housing goal was meant to

[112]The goals with respect to low- and moderate-income housing were 28% for 1993 and 30% for 1994 (The American Banker (10/14/1993)). For housing located in central cities, the goals were 26% and 30% for 1993 and 1994, respectively.

recognize that the dollar amount of conventional mortgages originated was expected to be substantially lower in 1995 than the volume of originations in 1992. The goals applied on a proportional basis for that portion of 1995 before permanent goals were established. The lower 1995 goal was therefore entirely due to changes in mortgage market conditions rather than policy, and we therefore do not record any change in purchase activity as a result of the extension of the interim goals.

The Federal Reserve's 1995 Annual Report suggested that the new affordable housing goals were substantially altering the Enterprises' purchase behavior, noting they had recently "*initiated a variety of affordable home loan programs intended to benefit lower-income and minority households*" and impacts of affordable housing goals appeared to be showing up in HMDA microdata (Annual Report of the Federal Reserve Board 1995, p. 203).[113]

HUD Final Rule on Housing Goals

Issued: December 1, 1995

See listing under FNMA (Sec. 3.4.1) for a broader overview of the revised housing goals.

[113]The report elaborated: "*A year-to-year comparison of the HMDA data suggests that these programs may be making a difference. From 1992 to 1993 the number of conventional home purchase loans extended to lower-income borrowers increased 38 percent compared with an 8 percent increase for higher-income homebuyers. The trend continued into 1994. The 1994 HMDA data show that the number of loans to lower-income borrowers increased about 27 percent while the number extended to higher income borrowers increased about 13 percent... Among racial or ethnic groups from 1993 to 1994, the number of loans to black applicants increased 55 percent, to Hispanic applicants 42 percent, and to Asian applicants 19 percent. The increase for white applicants was 16 percent over the same period*" (Annual Report of the Federal Reserve Board 1995, p. 203).

Policy Change:	Affordable Housing Goals: Multifamily
Agency:	FHLMC
Impact:	+$0.61 billion
News:	Dec. 1995
Effective:	Jan. 1996
Classification:	Non-Cyclical

On December 1, 1995, HUD issued new housing goals for 1996–1999, effective January 2, 1996 (60 FR 61846). Freddie Mac had met HUD's headline housing goals throughout 1993–1995, but by much narrower margins than Fannie Mae. Freddie's relative struggles with the new goals was largely attributed to Fannie's larger presence in the multifamily mortgage market (GAO (1998)).[114] Freddie Mac missed its $750 million multifamily portion of the special affordable housing goal for 1993–1994, when it purchased just $495 million worth of qualifying multifamily mortgages (FHLMC Annual Report 1995, p. 31). Freddie also missed another HUD goal for the fraction of purchases for mortgages in central cities in both 1993 and 1994 (The American Banker (3/9/1995)). Freddie tried to compensate for these shortfalls in 1995, eclipsing that year's $375 million special affordable goal for multifamily mortgages.

But HUD's new special affordable goals set a considerably higher multifamily mortgage purchase goal of $988 million—set at 0.8% of Freddie's total purchases in 1994—annually for 1996–1999 (60 FR 61851).[115] By comparison, HUD's final rule noted that subgoal-qualifying multifamily mortgage purchases

[114] After suffering large losses in the late 1980s, Freddie completely withdrew from the multifamily market in 1990, and only returned to the market in 1993 to satisfy the affordable housing goals (FHLMC Annual Report 1992, p. 34).

[115] See listing under FNMA (Sec. 3.4.1) for an overview of the headline affordable housing goals set by the final rule.

accounted for only 0.36% of Freddie's total purchases in 1994 (60 FR 61859). Given Freddie's challenges meeting the multifamily and central cities subgoals, we deem this large increase a significant policy change that would have affected Freddie's purchase behavior. We assign an annualized increase in purchases of $613 million in January 1996, scored as the difference between Freddie's multifamily special affordable housing goals for 1995 and 1996. Ex ante, Freddie was just barely able to meet its higher multifamily special affordable housing subgoals, whereas Fannie hit roughly twice its higher multifamily targets (GAO (1998), p. 18). And unlike Fannie, Freddie clearly had to change its purchase behavior to accommodate the multifamily goals, most notably reinstating its halted purchase program in 1993, though not all of its resumed multifamily purchases were goal-qualifying.

HUD had published proposed rules on February 16, 1995 (60 FR 9154), but citing credit risk, Freddie Mac pushed back vigorously against multifamily mortgage provisions during the ensuing public comments period; moreover, both GSEs pushed back against HUD's definition and measurement of the multifamily mortgage market. The final rule explained that "*[i]n response to comments received and upon further consideration by the Secretary this final rule substantially changes the proposed rule's formulation of the Special Affordable Housing Goal*," notably removing equal targets for owner-occupied versus rental housing subgoals and instead setting fixed minimum multifamily subgoals (60 FR 61859). HUD also chastised Freddie Mac, citing that "*[i]n 1994, Fannie Mae purchased five times as many multifamily mortgages as Freddie Mac... the economic analysis prepared for this rule does not support the argument that the goals will expose the GSEs to unacceptably high levels of credit risk.*" The rule elaborated that "*HUD recognizes that Freddie Mac experienced losses on its multifamily business in the late 1980s, in part be-*

cause of flawed corporate oversight mechanisms, resulting in Freddie Mac's withdrawal from the multifamily market. However, half a decade has passed since that experience, providing Freddie Mac with sufficient time to develop a multifamily business" (60 FR 61852). Given the GSE's pushback regarding multifamily subgoals and subsequent, substantive revisions to HUD's Special Affordable Housing Goals, we date the news of the multifamily mortgage subgoals being made public to publication of the final rule on December 1, 1995.

The tightening of affordable housing goals for 1996 was ostensibly about social policy objectives promoting homeownership and housing for lower-income households. The implementation of the new goals was also long required by the FHEFSSA of 1992, rather than an unexpected development stemming from housing market or financial conditions. We found no evidence that the increased goals were cyclically motivated, and the housing and mortgage market would not have justified any such cyclical motivations. The Federal Reserve's Annual Report for 1995 noted that, shaped by mortgage rate fluctuations, "*residential investment fell in the first half of 1995 but turned up in the second half... [but] the intra-year swings in the various housing indicators left the annual totals for these indicators at fairly elevated levels. Sales of existing homes in 1995 were well above the annual average for the 1980s, even after adjusting for increases in the stock of houses*" (Annual Report of the Federal Reserve Board 1995, p. 9). We thus classify the change as primarily motivated by social policy objectives, particularly increasing lower-income homeownership, and unrelated to the business or financial cycle.

New HUD Regulations on Housing Goals

Issued: October 31, 2000

See listing under FNMA (Sec. 3.4.1) for a broader overview of the revised housing goals.

Policy Change:	Affordable Housing Goals
Agency:	FHLMC
Impact:	+$24.4 billion
News:	July 1999
Effective:	Jan. 2001
Classification:	Non-Cyclical

On October 31, 2000, HUD published a final rule significantly increasing affordable housing goals for 2001–2003 for both Fannie and Freddie, which were virtually identical to a new proposal outlined by the HUD Secretary on July 29, 1999. We assign the same $24.4 billion annualized increase in purchases for Freddie as assigned to Fannie (see listing under FNMA, Sec. 3.4.1). Financial markets appeared to react to new information revealed with both the proposed rule and final rule publication. News of the proposed affordable housing policy leaked on July 28, 1999, after HUD announced a scheduled press conference with Secretary Cuomo and Fannie Chairman Raines the following day. Freddie's share price fell 0.6% that day, 0.8 percentage points below the S&P 500's gain for the day, despite also announcing better-than-expected second quarter earnings results. Shares rebounded 0.7% the next day, closing 2.5 percentage points above the S&P 500, after Freddie 'balked' and lodged a formal complaint against HUD's proposed affordable housing goals, citing concerns about the size of the increase as well as Freddie's disadvantaged position with respect to its multifamily housing program, which was a quarter the size of Fannie's (Dow Jones News Service (7/29/1999)); Freddie announced it would submit detailed

objections during the public comment period for the proposed rule.[116] When the proposed rule was detailed on March 2, 2000, Freddie's stock price fell 3.3%, for a negative excess return of -3.5 percentage points below the S&P 500. Freddie's share price fell 0.8% upon the announcement of the final rule on October 31, 2000, for a negative excess return of 3.0 percentage points below the S&P 500.

As with Fannie, we determine news of the more aggressive affordable housing goals to have been made public in July 1999. The implications of the proposed rules and Freddie's unsuccessful efforts to water them down appear to have been gradually priced into Freddie's shares, well in advance of the eventual rules being made effective in January 2001. And as with Fannie, we classify the policy change as unrelated to the business cycle (see the listing under FNMA, Sec. 3.4.1).

OFHEO Ruling on Capital Requirements

Issued: September 13, 2001

Pursuant to FIRREA, OFHEO gradually developed 'stress-test' risk-based capital rules, which were issued in September 2001, to be made effective September 13, 2002. But Fannie and Freddie both maintained capital well in excess of the regulatory risk-based capital standard until mid-2008, so we do not consider this to be a binding, significant policy change affecting the Enterprises' portfolio behavior. See listing under FNMA (Sec. 3.4.1).

SEC Disclosure Requirements

[116]Contrary to Freddie's combative stance and share price movements surrounding HUD's various announcements of the new affordable housing goals, its management claimed in the 1999 Annual Report that adoption of the proposed rule "*would not have a material adverse effect on Freddie Mac's results of operations or financial condition*," though this could have been an attempt to manage shareholder sentiment (FHLMC Annual Report 1999, p. 42).

Agreement: July 12, 2002

On July 12, 2002, Fannie and Freddie agreed to register their common stock with the SEC and 'voluntarily' comply with SEC disclosure requirements, preempting legislative action requiring them to do so. We do not consider this to be a significant policy change affecting the Enterprises' purchase behavior. See listing under FNMA (Sec. 3.4.1).

Accounting Scandal: Capital Surcharge

Announced: January 29, 2004

Allegations of accounting irregularities at Freddie Mac emerged in 2002. On January 22, 2003, Freddie announced that disallowed accounting policies related to hedging employed by its previous external auditor, Arthur Anderson, necessitated restating financial results for 2001 and 2002, and possibly 2000. On June 7, 2003, OFHEO launched a special examination into the accounting irregularities. On June 8, 2003, Freddie Mac President David Glenn was terminated for due cause based on inadequate cooperation with an internal investigation and for altering personal records, while Chairman Leland Brendsel and Chief Financial Office Vaughn Clarke abruptly stepped down (The New York Times (6/9/2003)). On November 21, 2003 the company restated financial results, which led to a $5 billion increase in cumulative retained earnings and $5.2 billion increase in core capital (OFHEO (2003), p. 1). OFHEO released its special examination report on December 10, 2003 and Freddie agreed to pay a $125 million penalty for inappropriate conduct and improper management of earnings. The report concluded that Freddie Mac had disregarded accounting rules, internal controls, and disclosure standards, and ultimately violated the public trust in its pursuit of steady earnings growth—notably by improperly using a

number of strategies to shift earnings among quarters, to stabilize growth in earnings per share. The report recommended that Freddie be required to hold a capital surplus and urged consideration of limiting retained portfolio growth until it produced certified financial statements.

On January 29, 2004, OFHEO imposed a capital surcharge of 30% above the minimum capital surplus in response to increased operational risk. The surcharge requirement was effective immediately and would remain in place until timely, certified financial statements were produced. The order also mandated OFHEO's approval for any corporate action that might impair Freddie's ability to achieve the targeted capital surplus. In the news release announcing the surcharge, OFHEO reported a capital surplus as of November 30, 2003 of $8.1 billion, 32.2% above the standing statutory minimum requirement (OFHEO (2004d)). The surplus for November 30, 2003 did not reflect pending 2003 financial statement adjustments, but did reflect the increase in capital of approximately $5 billion from the 2002 restatement process. Freddie's 2003 Annual Report explained that "*[w]hile OFHEO's framework includes stringent monitoring and imposes restrictions on share repurchases and other capital activities, we do not expect it to adversely affect our disciplined growth strategy in most scenarios. Had the target capital surplus been in effect at December 31, 2003, our estimated surplus in excess of the target would have been approximately $2.1 billion*" (FHLMC Annual Report 2003, p. 36). Similarly, Freddie's 2004 Annual Report reported core capital of $35.0 billion as of December 31, 2004, $10.9 billion in excess of the minimum statuary capital requirement and approximately $3.6 billion in excess of the amount required with the 30% capital surcharge (FHLMC Annual Report 2004, pp. 22, 89).[117]

[117]While not required by OFHEO's capital surcharge, Freddie's capital surplus had grown by $2.0 billion since December 2003, driven by higher retained earnings and a slight contraction in

Because the restatement of recent earnings resulted in an increase in core capital—unrelated to any policy change—to levels well exceeding the amounts newly required by the capital surcharge and no portfolio adjustments appeared to be needed, we do not classify the imposition of the capital surcharge as a binding, significant policy change expected to impact Freddie's retained portfolio.

New HUD Regulations on Housing Goals

Issued: November 1, 2004.

See listing under FNMA (Sec. 3.4.1) for a broader overview of the revised housing goals.

Policy Change:	Affordable Housing Goals
Agency:	FHLMC
Impact:	+$7.6 billion
News:	Apr. 2004
Effective:	Jan. 2005
Classification:	Non-Cyclical

Affordable housing goals came up for renewal in 2004. In April, HUD proposed more aggressive rules for 2005–2008, and published a final rule in November setting goals that were slightly scaled back but quite similar to those initially proposed (see discussion under FNMA, Sec. 3.4.1). There is abundant evidence that this round of affordable housing goal increases began to substantially alter the Enterprises' purchase and portfolio behavior (FCIC (2011), pp. 186–187). Freddie's 2004 Annual Report stated that "*[w]e believe that meeting these goals and subgoals will be challenging and there can be no assurance that we*

Freddie's balance sheet, perhaps due to the refinancing boom's end.

will meet all of them in 2005 or beyond. We are making significant efforts to meet the new goals and subgoals through adjustments to our mortgage sourcing and purchase strategies, including changes to our underwriting guidelines and expanded and targeted initiatives to reach underserved populations" (FHLMC Annual Report 2004, p. 11). Despite warning that the goals could reduce profitability, Freddie reiterated its support for the affordable housing component of its public mission: "*We view the purchase of mortgage loans benefitting low- and moderate-income families and neighborhoods as a principal part of our mission and business, and remain committed to fulfilling the needs of these borrowers and markets.*" The 2006 Annual Report similarly emphasized that: "*We are making certain changes to our business to meet HUD's housing goals and subgoals, which may adversely affect our profitability. We are purchasing loans and mortgage-related securities that offer lower expected returns on our investment and increase our exposure to credit losses*" (FHLMC Annual Report 2006, p. 13).

Freddie Mac retroactively estimated that there was zero cost to meeting its affordable housing goals over 2000–2003, when goals were met through 'profitable expansion,' but goals became harder to meet as the refinancing boom increased the share of non-qualifying mortgage originations (FCIC (2011), p. 186). Freddie estimated that over 2005–2008, roughly 4% of loan purchases, or roughly $31.4 billion, were made "*specifically because they contribute to the goals*," suggesting that the goals issued in 2004 forced Freddie to alter and expand its purchases. Rather than being strictly profitable, costs associated with carrying such loans were estimated to average $200 million annually over 2003–2008 (FCIC (2011), p. 186), again suggesting significant portfolio effects from the elevated affordable housing goals. We assign the same impact to Freddie as to Fannie, an annualized increase in purchases of $7.6 billion for the goals' first

year of effect (see discussion in listing under FNMA, Sec. 3.4.1).

When the proposed goals were first leaked, Freddie's shares fell 0.4% on April 6, 2004, closing 0.2 percentage points below the S&P 500 for the day. The final rule's one percentage point reduction across the three goals, relative to the proposed rule, was received positively, although the response to shares may have been muted by speculation about the imminent presidential election; Freddie's stock price rose 0.1% on November 1 and 0.9% on November 2 on leaked news of the final rule and its publication in the Federal Register, respectively, closing roughly 0.1 percentage points and 0.9 percentage points above the S&P 500 those days. Given the similarity of the final rule to the proposed rule, and markets' initial pricing of the more aggressive rules, we date the news of the housing goals as being made public in April 2004, as with Fannie. And as with Fannie, we classify the affordable housing goals as driven by social policy objectives as well as a longstanding legal requirement set by FHEFSSA, and unrelated to the business or credit cycle (see listing under FNMA, Sec. 3.4.1, for an explanation for this classification).

OFHEO-Freddie Settlement: Portfolio Growth Limit

Announced: August 1, 2006

Policy Change:	Portfolio Growth Limit Imposed
Agency:	FHLMC
Impact:	-$42.8 billion
News:	June 2006
Effective:	July 2006
Classification:	Non-Cyclical

Throughout 2005 and 2006, political pressure built to rein in Fannie and Freddie, particularly by curbing the GSEs' retained portfolios.[118] In a high-profile May 2005 speech at the Federal Reserve Bank of Atlanta, Federal Reserve Chairman Alan Greenspan was highly critical of the GSEs' balance sheet expansion and recommended portfolio limits: "*The Federal Reserve Board has been unable to find any credible purpose for the huge balance sheets built by Fannie and Freddie other than the creation of profit through the exploitation of the market-granted subsidy. Fannie's and Freddie's purchases of their own or each other's mortgage backed securities with their market-subsidized debt do not contribute usefully to mortgage market liquidity, to the enhancement of capital markets in the United States, or to the lowering of mortgage rates for homeowners*" (Greenspan (2005)).

Coinciding with the May 2006 release of OFHEO's final report investigating Fannie Mae's accounting scandal, Fannie entered an agreement with OFHEO and the SEC that included capping its retained portfolio at its value from the end of 2005.[119] In response to a request by OFHEO, Freddie announced on August 1, 2006 that it would voluntarily and temporarily limit the growth of its retained portfolio to no more than than 2.0% annually (and 0.5% each quarter) from its $710.3 billion portfolio as of June 30, 2006, as measured by GAAP accounting rules. Freddie's 2006 Annual Report stated: "*We expect to keep the limit in place until we return to producing and publicly releasing quarterly financial statements prepared in conformity with US generally accepted accounting principles*" (FHLMC Annual Report 2006, p. 4). Permissible portfolio growth was additionally limited to "*assets that are intended to help [Freddie] meet [their] affordable housing goals or subgoals*," particularly multifamily whole loans, private-label

[118]See discussion in 'Accounting Scandal: Capital Shortfall and Surcharge' and 'OFHEO-SEC-Fannie Settlement: Portfolio Caps' listed under FNMA, Sec. 3.4.1.

[119]See 'OFHEO-SEC-Fannie Settlement: Portfolio Caps' under FNMA, Sec. 3.4.1.

MBS, and commercial MBS (American Banker (8/2/2006)), further suggesting the limits would have a substantial impact on purchase behavior. The limits were made retroactively effective July 1, 2006.

Prior to the consent agreement, Freddie had "*stated that it will grow in line with the growth rate of the overall MBS (mortgage-backed securities) market*" according to a market analyst (Dow Jones News Wire (5/24/2006)). And unlike Fannie Mae, Freddie Mac's portfolio had been steadily growing throughout 2005 and 2006—widely interpreted as Freddie exploiting Fannie's accounting problems and capital shortfall to gain market share—until being abruptly curtailed by the portfolio limit. To measure the impact of the portfolio caps, we rely on counterfactual portfolio growth based on a June 21, 2006 Greenbook forecast of 9.5%, 8.4%, and 7.1% annualized growth rates for US mortgage debt for 2006Q3, 2006Q4, and 2007, respectively. Applying these growth rates to a retained portfolio of $710.3 billion as of June 30, 2006 suggests counterfactual mortgage portfolio growth of $31.1 billion in the second half of 2006 and another $25.9 billion in the first half of 2007 without the cap's imposition.[120] With the annual 2% portfolio growth cap, the maximum permissible portfolio expansion would have been $14.2 billion in the year from June 30, 2006. Annualizing, we assign a purchase reduction of $42.8 billion for the portfolio limit's initial imposition ($14.2 - ($31.1 + $25.9) = -$42.8).[121]

The introduction of portfolio caps had been publicly anticipated somewhat before being announced by Freddie. FHLMC had reduced its mortgage portfolio in both May and June 2006, slowing annualized growth for the first half of the

[120] For the second half of 2006 and first half of 2007 combined, $\$710.3 \times (1.095)^{1/4} \times (1.084)^{1/4} \times (1.071)^{2/4} - \$710.3 = \$57.0$.

[121] We do not apply the two-year rule here because of the quarter-by-quarter binding nature of the portfolio limits.

year to 3.4%, down from 8.4% portfolio growth in 2005, though May's deceleration was only first made public in late June (American Banker (7/25/2006)). By stark contrast, its retained portfolio had grown at annualized rates of 17.2% and 14.0% in March and April, respectively (Dow Jones News Wire (5/24/2006)).[122] In a conference call with shareholders regarding 2005 net earnings, held after markets had closed on May 30, FHLMC CEO Richard Syron announced that the corporation expected to be in talks with OFHEO about the possibility of portfolio limits (Dow Jones Newswires (5/30/2006)).[123] On June 6, *The Wall Street Journal* reported that "*Freddie Mac may face limits on its holdings of mortgage loans and related securities*" (The Wall Street Journal (6/7/2006)). In testimony earlier that day before a House Financial Services subcommittee, OFHEO Director Lockhart flagged that the "*chairman of Freddie Mac mentioned that, I believe last week, in a press conference he did mention that we have discussed the idea that there* ***should be some sort of freeze*** *there as well*" and that a consent agreement was possible, but would require Freddie's voluntary agreement. Lockhart also claimed that Freddie was at least two years away from "*having acceptable accounting and internal controls and a risk management system.*" Shares of Freddie fell 3.3% for the day, for a daily negative excess stock return of 3.2 percentage points below the S&P 500. Shares had also fallen 2.5% on May 31, for a negative excess excess return of 3.3 percentage points below the S&P 500, as markets priced in both disappointing 2005 earnings results and Syron's warning about the potential for portfolio caps.

[122]These growth rates are based on the non-seasonally adjusted portfolio data reported at the time. Ex post, seasonally adjusted data show a similar decline from annualized growth rates slightly above 10% in March and April to portfolio contractions of 7.6% and 3.3%, respectively, in May and June.

[123]Syron stated that: "*[OFHEO Director] Lockhart has indicated that he intends to consider whether additional remedial actions may be appropriately applied to Freddie Mac while we continue to fix our control environment, and this could include consideration of portfolio growth limitations for some period of time*" (National Mortgage News (6/5/2006)).

In mid-June, the Treasury Department publicly announced that it was reviewing its process for approving the Enterprises' debt issuance requests, widely interpreted as the Bush administration threatening that it would unilaterally limit the GSEs' portfolios if Congress or OFHEO did not act (The Wall Street Journal (6/14/2006)). On June 27, Freddie announced that it had reduced its retained portfolio in May, which was characterized at the time as "*a clear departure from April, when the housing-finance agency grew its portfolio by an annualized rate of 14.0%*" (Dow Jones Newswires (6/27/2006)). *Dow Jones Newswires* reported that the move was likely intended to avoid irking OFHEO, and that since the regulator's imposition of portfolio limits on Fannie in late May, "*market participants have speculated that similar constraints might be placed on Freddie, or that Freddie might voluntarily impose them on itself*" (Dow Jones Newswires (6/27/2006)). Considered in this context, particularly Treasury's threat about blocking agency debt issues, we consider the imposition of portfolio caps a de facto regulatory change as opposed to strictly 'voluntarily.'

In early July, *The Wall Street Journal* reported that OFHEO Director Lockhart would like to see the Enterprises maintain a countercyclical role yet be shrunk to a 'smaller scale,' and that "*Mr. Lockhart appears likely to impose a similar restraint on Freddie*" as on Fannie (The Wall Street Journal (7/5/2006)). On July 7, an interview with Lockhart published by the *American Banker* reported that "*Freddie would agree soon to cap its mortgage portfolio*," and that a deal was expected within the next three weeks (American Banker (7/7/2006)). While Lockhart's interview was re-reported in a number of outlets that day, shares of Freddie fell only 0.1% and outperformed the S&P 500 by 0.6 percentage points for the day, suggesting that the expectation of portfolio caps for Freddie had already been priced in. Upon the portfolio caps' announcement on August 1, Freddie's

share price fell 0.6%, underperforming the S&P 500 by just 0.1 percentage points for the day. Moreover, *Dow Jones Newswires* reported that the announcement of portfolio limits "*was widely anticipated and had little impact on valuations of the debt it uses to fund its purchases*" (Dow Jones News Wire (8/1/2006)). Consequently, we date the expectation of portfolio caps as being made public in June 2006, when market participants learned that Freddie was starting to reduce its portfolio and the news of looming caps seemed to be priced into Freddie's shares.

The Federal Reserve's Annual Report noted that "*the housing market cooled substantially*" in 2006, and was dampening overall economic activity (Annual Report of the Federal Reserve Board 2006, p. 3), but we find no evidence that the imposition of portfolio caps was motivated by trying to further cool housing market activity. The Bush administration, which, along with the Greenspan Fed, wanted the GSEs downsized and eventually privatized, was widely perceived as exploiting the accounting scandals to rein in first Fannie and then Freddie as well (McLean (2015), pp. 85–86, Greenspan (2007), p. 242). Senator Chuck Schumer, for instance, claimed that "*there are a whole lot of people who want to take advantage of the auditing problems that Fannie and Freddie have done to take the whole thing down*" (Dow Jones Capital Markets Report (5/23/2006)). We classify the imposition of Freddie's portfolio caps as motivated by long-standing partisan objections to the GSEs' portfolio growth, particularly by the current administration, and unrelated to the business cycle.

OFHEO Relaxes Portfolio Caps

Announced: September 19, 2007

See listing under FNMA (Sec. 3.4.1) for economic and regulatory context.

Policy Change:	Portfolio Limit Increase
Agency:	FHLMC
Impact:	+$2.14 billion
News:	Sep. 2007
Effective:	Sep. 2007
Classification:	Cyclical

On September 19, 2007, OFHEO announced changes to its methodology for calculating the mortgage portfolio cap in order to provide both Fannie and Freddie greater flexibility in managing increasingly volatile market-based fluctuations. The new agreement increased FHLMC's baseline for the retained portfolio cap to $735 billion measured in UPB at the end of 2007Q3, revised upward from a $728.1 billion GAAP portfolio limit in place under the previous agreement (OFHEO (2007)). The 2.0% annual growth limit and 0.5% quarterly growth rate limit were maintained for Freddie and extended to Fannie, which had previously faced a flat nominal limit. As with Fannie, the changes were intended to encourage Freddie to purchase or securitize up to $20 billion in subprime loans in the short run.

The maximum permissible 2% growth rate would allow a portfolio of up to $749.7 billion in 2008Q3, as measured by UPB. The OFHEO press release explained that "*UPB often exceeds the GAAP value for the Enterprises. Due to market fluctuations over the first seven months of 2007, this difference has ranged from $0.1 billion to $9.4 billion*" (Market News International (2007)). Fannie's Monthly Volume Surveys for August and September 2007 suggested that their retained portfolio was roughly $4.8 billion higher when measured on a UPB

basis rather than a GAAP basis (see listing under FNMA, Sec. 3.4.1).[124] In scoring the policy change, we add this difference to the $728.1 billion portfolio limit based on GAAP as a baseline limit measured in UPB. Assuming the caps were binding constraints, we assign an annualized increase in Freddie's potential purchases of $2.14 billion in the year starting September 2007 ($749.7 − 1.02×($728.1+$4.8) =$2.14). Given the emphasis of purchasing a higher $20 billion in subprime mortgage securities in the 'short run,' we do not invoke the two-year rule.

Freddie's share price rose 2.8% when the policy was announced on September 19, a gain 2.1 percentage points above that of the S&P 500 for the day. As with Fannie, we determine the news of the portfolio limit relaxation to have been made public in September. And as with Fannie, we classify the relaxation of portfolio caps as driven by cyclical financial concerns (see listing under FNMA, Sec. 3.4.1, for a more detailed discussion of this classification).

Economic Stimulus Act of 2008 (Pub.L. 110-185)

Enacted: February 13, 2008

See listing under FNMA (Sec. 3.4.1) for economic context and legislative background.

[124] No comparable comparison between UPB and GAAP valuations could be found for Freddie's balance sheet during this period.

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FHLMC
Impact:	+$41.57 billion
News:	Feb. 2008
Effective:	Apr. 2008
Classification:	Cyclical

The Act increased the conforming loan limit in high-cost areas from $417,000 to up to $729,750, the so-called 'super-conforming loan limit.' We estimate that the increase in the conforming loan limit raised the GSEs' purchase capacity by $83.14 billion for 2008, which we split evenly between Fannie and Freddie. As with Fannie, we determine the news of the conforming loan limit policy change to have been made public in February 2009. And as with Fannie, we classify this sizable increase in conforming loan limits as driven by cyclical financial concerns (see listing under FNMA, Sec. 3.4.1, for an overview of this scoring and classification).

OFHEO Reduces Capital Surcharge

Announced: March 19, 2008

See listing under FNMA (Sec. 3.4.1) for economic context and regulatory background.

Policy Change:	Removal of Portfolio Limit
Agency:	FHLMC
Impact:	+$9.05 billion
News:	Feb. 2008
Effective:	Mar. 2008
Classification:	Non-Cyclical
Policy Change:	Reduced Capital Surcharge
Agency:	FHLMC
Impact:	+$43.33 billion
News:	Mar. 2008
Effective:	Mar. 2008
Classification:	Cyclical

On February 27, 2008, OFHEO announced that the caps on the Enterprises' portfolios were being removed effective March 1, 2008. Fannie and Freddie had begun filing timely financial reports again, for the first time since the accounting scandals, which reportedly motivated the change (The New York Times (2/28/2008)). OFHEO also noted substantial progress made by both GSEs in reforming and improving internal systems and controls. Citing recent losses and market conditions, however, OFHEO initially retained the 30% capital surplus above the statutory minimum capital requirement—much to the consternation of some lawmakers—but noted that it would discuss phasing out the surcharges as their consent orders approached being lifted. In a quick reversal after the collapse of Bear Stearns, OFHEO, Fannie, and Freddie announced an initiative on March 19 to increase mortgage market liquidity, including a reduction in the capital surcharges from 30% to 20% above the minimum statutory requirement, which was intended to pump $200 billion into the housing market (OFHEO

(2008)).

To assess the impact of the removal of the portfolio limits, we rely on a January 23, 2008 Greenbook forecast of 3.1% and 3.0% annualized growth rates for US mortgage debt for 2008 and 2009, respectively. Applying this growth rate to a retained portfolio of $710 billion at year's end 2007 would suggest projected mortgage portfolio increases exceeding that under the previously permitted 2% growth rates of $7.8 billion in 2008 and $15.3 billion in 2009.[125] Prorating growth between the two years, we assign a potential annualized increase in Freddie's retained portfolio of $9.05 billion in the year starting March 2008 from the portfolio cap's removal ($\$7.8 \times \frac{10}{12} + \$15.3 \times \frac{2}{12} = \$9.05$).

The decrease in the capital surcharge announced the following month lowered Freddie's capital requirement from $34.4 billion to $31.8 billion, or by $2.6 billion (The Washington Post (3/20/2008)). Made possible by the recent removal of the portfolio caps, OFHEO estimated that the combined reduction of about $5.9 billion would allow Fannie and Freddie to immediately add up to $200 billion of MBS to their portfolios, consistent with a binding 3% minimum capital requirement. For FHLMC, the release of $2.6 billion in capital would thus expand their potential retained portfolio by $86.67 billion ($\frac{\$2.6}{0.03} = \$86.67$). Using the two-year rule, we assign an annualized impact of $43.33 billion for Freddie's retained portfolio resulting from the capital surcharge reduction in its first year of effect.

On the announcement of the caps' removal, Freddie's stock price jumped in mid-day trading on February 27, gaining up to 4% after the announcement, but shares closed down 0.5% for the day, 0.4 percentage points below the daily

[125] For 2008, $\$710 \times (1.031 - 1.02) = \$7.8$. For 2009, $\$710 \times (1.031 \times 1.03 - 1.02^2) = \$15.3$.

return on the S&P 500, as markets priced in worse-than-expected fourth quarter losses posted later that day (Dow Jones Newswires (2/27/2008)). Shares rose 26.2% on speculation and news leaking about a reduction in the capital surcharge on March 18, gaining 22.0 percentage points more than the S&P 500, and rising another 14.9% on March 19, 17.3 percentage points above the daily return on the S&P 500. As with Fannie, we determine the news of the portfolio limit's removal to have been made public in February 2009 and news of the capital surcharge's termination to have been made public in March 2009. And as with Fannie, we classify the removal of the portfolio caps as principally motivated by a standing regulatory commitment and not cyclically motivated, whereas we classify the subsequent reduction of capital surcharges as cyclically motivated (see listing under FNMA, Sec. 3.4.1, for a detailed discussion of this classification).

Provisional Fed Lending to Fannie and Freddie

Announced: July 13, 2008

On July 13, 2008, the Federal Reserve authorized provisional lending to Fannie and Freddie if it proved necessary. No such lending was made before the Enterprises were taken into conservatorship on September 7, 2008 (see below).

Housing and Economic Recovery Act of 2008 (Pub. L 110-289)

Enacted: July 30, 2008

See listing under FNMA (Sec. 3.4.1) for economic context and regulatory background.

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FHLMC
Impact:	-$13.34 billion
News:	July 2008
Effective:	Jan. 2009
Classification:	Cyclical

The Act consolidated GSE oversight to the newly created FHFA. The Act also set a structure for conforming loan limits for the nation as a whole, as well as for high-cost areas, which would be annually indexed based on a home price index. The Act amended the Enterprises' charters to permanently set the national conforming loan limit at $417,000 and increase the conforming loan limit for high-cost areas, defined as areas in which 115% of the median home price exceeded the national conforming loan limit, setting super-conforming loan limits to the lesser of that amount or 150% of the conforming loan limit. The changes were effective December 31, 2008, when the ESA super-conforming loan limit expired. On November 7, 2008, FHFA announced that the single-family home conforming loan limit for most areas of the country would be kept at $417,000 for 2009, but the new formula reduced the maximum super-conforming loan limit from $729,750 to $625,500. Scored on a current policy basis, we estimate that the reduction in the super-conforming loan limit would have reduced Enterprises purchases by $26.68 billion in 2009, and allocate half this potential portfolio decrease, or $13.34 billion, to Freddie. As with Fannie, we do not consider the news of the reduction from the ESA to HERA conforming loan limit to have been made public until July 2008. And as with Fannie, we classify the policy change as cyclically motivated (see listing under FNMA, Sec. 3.4.1, for an overview of this scoring and classification).

FHFA Conservatorship

Announced: September 7, 2008

See listing under FNMA (Sec. 3.4.1) for economic context and regulatory background.

Policy Change:	Portfolio Limit Increase
Agency:	FHLMC
Impact:	+$66.75 billion
News:	Sep. 2008
Effective:	Sep. 2008
Classification:	Cyclical

Fannie and Freddie were taken into government conservatorship by the Treasury Department and FHFA on September 7, 2008. Freddie Mac's Senior Preferred Stock Purchase Agreement with Treasury mirrored Fannie's (see listing under FNMA, Sec. 3.4.1). Freddie's retained mortgage portfolio was not to exceed $850 billion as of December 31, 2009, with this limit to be subsequently reduced by 10% each year until reaching $250 billion in 2021. There is abundant evidence that regulators were strong-arming both Enterprises to markedly ramp up their near-term purchases to provide additional liquidity to mortgage markets ahead of the portfolio cap reductions (see listing under FNMA, Sec. 3.4.1). We do not attempt to estimate the counterfactual evolution of the mortgage portfolio in the absence of the SPSPA and simply measure the impact relative to the portfolio outstanding on August 30, 2008. On that date, the total retained portfolio was approximately $761 billion, implying a maximum increase of $89 billion by the end of 2009, or an annualized increase of $67.5 billion ($\$89 \times \frac{12}{16}$ =$66.75) in the year from September 2008.

The conservatorship announcement wiped out nearly all remaining stockholder equity, with shares having already fallen 91.5% in the year to September 5, 2008. When markets reopened on Monday, September 8, Freddie's share price fell 82.8%, to 88 cents, from previously closing at $5.1 per share. The possibility of conservatorship clearly had not been fully priced into Freddie's shares. Hereafter we largely cease reporting information about Freddie's share price, as its movements became highly volatile and generally uninformative. As with Fannie, we classify Freddie's placement into conservatorship as clearly cyclically motivated, with its news having been made public in September 2008 (see listing under FNMA, Sec. 3.4.1, for a more detailed discussion of context, scoring, and classification).

American Recovery and Reinvestment Act of 2009 (Pub. L. 111-5)

Enacted: February 17, 2009

See listing under FNMA (Sec. 3.4.1) for economic context and regulatory background.

Policy Change:	Jumbo Conforming Loan Limit
Agency:	FHLMC
Impact:	+$13.34 billion
News:	Feb. 2009
Effective:	Feb. 2009
Classification:	Cyclical

Shortly after the FHFA announced the super-conforming loan limit for 2009 was being reduced to $625,500 pursuant to HERA, Congress intervened to statutorily reinstate the higher $729,750 maximum super-conforming loan limit set by ESA (see ESA, HERA listings under FNMA, Sec. 3.4.1). ARRA re-established

the higher loan limit for 2009, which was then twice extended through the end of FY2011. We again estimate that roughly $26.68 billion in originations between the two super-conforming loan limits would have been acquired in 2009 (see HERA above), and allocate half this potential increase in retained portfolio purchases to Freddie. As with Fannie, we classify the reinstatement of the higher super-conforming loan limit as cyclically motivated, with its news having been made public in February 2009 (see listing under FNMA, Sec. 3.4.1, for an overview of this scoring and classification).

Homeowner Affordability and Stability Plan

Announced: February 18, 2009

See listing under FNMA (Sec. 3.4.1) for economic context and regulatory background.

Policy Change:	Portfolio Limit Increase
Agency:	FHLMC
Impact:	+$50 billion
News:	Feb. 2009
Effective:	May 2009
Classification:	Cyclical

The Homeowner Affordability and Stability Plan, a set of initiatives to prop up the beleaguered housing market announced by the President, Treasury Secretary, and HUD Secretary on February 18, 2009, increased Freddie's portfolio cap from $850 billion to $900 billion on December 31, 2009. The amendments to Freddie's SPSPA with the Treasury were identical to the amendments to Fannie's SPSPA (see FNMA, Sec. 3.4.1). We measure the impact of the SPSPA amendment as the difference in portfolio limits before and after the amendment,

assigning an annualized increase in Freddie's potential portfolio of $50 billion starting in February 2009. As with Fannie, we classify the increase in Freddie's portfolio limit as clearly cyclically motivated, with its news having been made public in February 2009 (see listing under FNMA, Sec. 3.4.1, for an overview of this scoring and classification).

Enterprise Transition Affordable Housing Goals for 2009

Issued: August 10, 2009

FHFA concluded that the affordable housing goals would not be achievable in 2009 for a variety of economic reasons, and thus lowered all three goals in addition to making the Enterprises' mortgages modified under the Homeowner Affordability and Stability Plan count toward the goals. We do not consider this action to be a binding, significant policy change. See listing under FNMA (Sec. 3.4.1) for background and context.

Second Amendment to Senior Stock Purchase Agreement

Announced: December 24, 2009

The Treasury Department replaced Freddie's $200 billion funding line with an unlimited funding commitment through 2012. We assign no related portfolio impact. See listing under FNMA (Sec. 3.4.1) for economic and regulatory context.

New Enterprise Housing Goals for 2010-2011

Issued: September 14, 2010

The FHFA overhauled and revised down its affordable housing goals for Fannie and Freddie in response to market conditions. We do not consider this

action a binding, significant policy change. See listing under FNMA (Sec. 3.4.1).

Third Amendment to Senior Stock Purchase Agreement

Announced: August 17, 2012

See listing under FNMA (Sec. 3.4.1) for background and context.

Policy Change:	Portfolio Limit Decrease
Agency:	FHLMC
Impact:	-$22.16 billion
News:	Aug. 2012
Effective:	Aug. 2012
Classification:	Non-Cyclical

On August 17, 2012, the Treasury Department announced a third amendment to the Enterprises' SPSPAs, which capped both retained portfolios at a reduced $650 billion by the end of 2012, accelerated the annual pace of subsequent wind down from 10% to 15%, and replaced the standing 10% quarterly dividend requirement with a sweep of all present and future net earnings (see FNMA, Sec. 3.4.1). The amendments to Freddie's SPSPA were identical to Fannie's. As of July 31, 2012, Freddie's total retained portfolio was approximately $576 billion, implying no additional mandated reduction by the end 2012. Under the newly amended SPSPA, the Enterprises' portfolios were capped at $552.5 billion by the end of 2013, down from $590.49 billion prior to the third amendment. We measure the impact of the SPSPA amendment as the difference in mandated reductions before and after the amendment. We assign an annualized requisite portfolio reduction of $22.16 billion for the year starting in August 2012, being the the required reduction for 2013 pro-rated through July (($552.5 - $590.49)$\times\frac{7}{12}$ = -$22.16).

While the Enterprises' share prices and excess returns became exceedingly volatile and rather uninformative after conservatorship sunk shares under a dollar, stock movements nonetheless suggest that the third SPSPA was genuinely unanticipated; Freddie's share price fell an unusually steep 23.3% on August 17, with trading volumes up more than 24-fold from the previous day of trading. Moreover, the news did not seem anticipated by the financial press. As with Fannie, we determine the news of the third SPSPA to have been made public in August 2012. And as with Fannie, we classify the third SPSPA amendment as motivated by varying political priorities and budgetary concerns, as opposed to being cyclically motivated (see listing under FNMA, Sec. 3.4.1, for an overview of classification and related context).

3.4.3 Government National Mortgage Association

The Housing and Urban Development Act (HUDA) of 1968 partitioned the Federal National Mortgage Association into two separate corporations: a publicly retained Government National Mortgage Association and a privately chartered, shareholder-owned FNMA granted government sponsorship and special legal privileges. GNMA was to continue FNMA's special assistance functions and the management and liquidations functions, authorized under Sections 305 and 306 of the National Housing Act, respectively, and retained FNMA's standing special assistance authority, assets, and liabilities pursuant to those statutes. The rechartered FNMA was to assume all secondary market operations and to retain the assets and liabilities pursuant to Section 304 of the National Housing Act (see FNMA, Sec. 3.4.1).

Ginnie Mae's special assistance functions were initially used to smooth mortgage credit during credit crunches and/or to provide support for special classes of less attractive, policy oriented FHA/VA mortgages at below-market rates. GNMA's special assistance authority was split between control of the White House and Congress. Authority under Section 305(c) could be used at the discretion of the president ('general Presidential special assistance authority'). And Section 305(g) authorized Congress to direct HUD to purchase mortgages for low-cost housing for low- and moderate-income families ('special assistance for low- and moderate-income housing').

In 1974, Congress authorized a new Emergency Mortgage Purchase Assistance program ('emergency special assistance'), aimed at stabilizing housing construction and easing the effects of inflation and monetary tightening on the housing and mortgage markets. GNMA's special assistance and emergency special assistance programs would often purchase loans at below-market rates and later resell them at par, with these functions essentially serving as revolving funds for a credit subsidy. Losses on sales were financed with borrowing from the Treasury and/or direct appropriations. By selling off its subsidized purchases, Ginnie reduced its footprint on the unified budget deficit, from gross purchases to net-of-sales purchases. Emergency special assistance authority was repeatedly extended until expiring in 1981, and all of GNMA's special assistance functions were fully repealed in 1983.

Prior to the split of Fannie and Ginnie, the Participation Sales Act of 1966 (Pub. L. 89-429) had authorized FNMA to issue participation certificates backed by pools of loans made or acquired by federal credit agencies. Shortly thereafter, the HUDA of 1968 authorized GNMA to issue MBS, and Ginnie marketed

the first ever MBS in 1970. Unlike the Enterprises, Ginnie's MBS were exclusively backed by mortgages insured or guaranteed by other government agencies, primarily FHA/VA mortgages, but also those of the US Department of Agriculture's Office of Rural Development and HUD's Office of Public and Indian Housing. In exchange for a fee, Ginnie guaranteed timely payment of interest and principal repayment, covering any loan losses in excess of the amount otherwise insured or guaranteed. Unlike the Enterprises' debt and securities, Ginnie's guarantee was always explicitly backed by the full faith and credit of the United States. And contrary to Fannie and Freddie, Ginnie always insured pools of mortgages issued by approved mortgagees (typically banks and credit unions) instead of purchasing and packaging securities themselves. Guaranteeing MBS has comprised nearly all of Ginnie's activity in mortgage markets since Congress wound down its special assistance programs in the early 1980s.

Ginnie Mae was created as a government corporation under HUD administration, and thus remained on the federal budget balance, with profits or losses passed on to the Treasury. Through the federal budget process, Ginnie Mae was subject to more programatic oversight than Fannie or Freddie.[126] Special assis-

[126]The federal budget process largely proceeds along three related tracks: administration budget requests, authorizations, and appropriation bills. The president requests a detailed budget from Congress, which proposes funding levels for agencies and programs. Through authorizing bills, Congress can create or repeal programs, and direct how federal funds should or should not be used. Appropriations bills set overall discretionary spending limits for agencies or programs. The Participation Sales Act of 1966 authorized the establishment of appropriations to cover interest payments to holders of government-backed PCs exceeding the interest payments received from the backing pool of mortgages or other obligations. Appropriations bills for the Department of Housing and Urban Development usually include a line item appropriating funds requested by the administration to cover any insufficiencies from participation sales, and a permanent, indefinite appropriation had been made for GNMA to cover insufficiencies for sales authorized through 1967 (The Budget for Fiscal Year 1979 Appendix, p. 493). Starting in 1980, the federal budget process began to impose explicit restrictions on federal credit programs and loan guarantees, including Ginnie Mae's MBS guarantees. Annual appropriations bills subsequently included a fiscal year aggregate limitation on Ginnie Mae's authorization to enter new commitments to issue guarantees under Section 306 of the National Housing Act. Prior to their repeal, the special assistance functions were also governed by congressional authorizations and

tance program funding was periodically adjusted in the appropriations process, and appropriations bills started limiting GNMA's commitments to guarantee mortgage securities starting in the early 1980s.

Housing and Urban Development Act of 1968 (Pub. L. 90-448)

Enacted: August 1, 1968

See listing under FNMA (Sec. 3.4.1) for economic context and legislative background.

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$0.25 billion
News:	July 1968
Effective:	July 1969
Classification:	Non-Cyclical

The Act split FNMA into the Government National Mortgage Association and a quasi-private shareholder-owned Fannie Mae. Ginnie Mae, a government corporation under HUD administration, assumed FNMA's special assistance and management and liquidations functions. Ginnie Mae remained on the federal budget balance, with profits or losses passed on to the Treasury. The scope of Ginnie's mortgage market operations was also largely governed by the federal budget process.

The Act also authorized Ginnie to guarantee MBS issued by FNMA or other approved issuers.[127] Ginnie, however, was only allowed to guarantee the timely payment of principal and interest on trust certificates or securities backed by

appropriations, switching to loan limits in 1980 (also set through appropriations).

[127] FNMA was not issuing MBS at the time (see FNMA, Sec. 3.4.1).

pools of mortgages insured under the National Housing Act (NHA) or guaranteed under the GI Bill. Ginnie was also authorized to collect guarantee fees from issuers. Unlike Fannie's MBS authorization, "*[t]he full faith and credit of the United States is pledged to the payment of all amounts which may be required to be paid under any guaranty*" authorized by GNMA's program. According to the 1970 Economic Report of the President, the objective of Ginnie's MBS program was "*to authorize a mortgage investment instrument that would be marketable and attractive to a wide range of investors not now interested in mortgages directly*" (Economic Report of the President 1970, p. 114).

The Act also increased Ginnie's special assistance authority under Section 305(c) of the NHA (general Presidential special assistance authority) by $500 million, to $3.325 billion, effective July 1, 1969. Using the two-year rule, we assign an annualized increase in GNMA's purchase capacity of $250 million. We determined that the news of this policy change was made public in July 1968, when the conference version of the bill was agreed upon, well in advance of the increased special assistance funding taking effect.[128] And we again classify the Act as non-cyclically motivated; legislative background, economic context, and this classification are discussed at length in the Act's listing under FNMA (see Sec. 3.4.1).

Housing and Urban Development Act of 1969 (Pub. L. 91-152)

Enacted: December 24, 1969

[128] An amendment to the Senate version of the bill, accepted on May 28, had reduced that bill's proposed increase in GNMA's special assistance funds from $500 million to $250 million. The higher $500 million increase was adopted in the conference agreement, which was agreed to by the Senate on July 25 and the House on July 26 (CQ (1969)).

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$0.75 billion
News:	Dec. 1969
Effective:	Dec. 1969
Classification:	Cyclical

The Act raised Ginnie's Section 305(g) authorization for total purchases and commitments outstanding for its special assistance program for low- and moderate-income housing to $2.5 billion, an increase of $1.5 billion. The revision was effective upon the bill's enactment. Using the two-year rule, we assign an annualized increase of $750 million in Ginnie Mae's purchase capacity in the year starting December 1969. The Act also increased the per-dwelling-unit loan limits on mortgages eligible for purchase under GNMA's special assistance programs.

The $1.5 billion increase in GNMA's special assistance authority and a requirement that purchases be made at par was amended onto the House version of the bill on October 22, which passed the next day (CQ (1970)); the Senate bill, considered and passed on September 23, had included no such provision. The Senate conferees later dropped their disagreement over GNMA's special assistance authorization and the conference bill, agreed upon on December 12, adopted the House bill's preferred increase(House Committee on Banking and Currency (1969b)). Consequently, we date the news of the increase as being made public in December 1969.

The Act also expanded statutory authority to use Ginnie's special assistance funds for subsidized purchases of mortgages. In its first years of operation,

GNMA developed a 'Tandem' plan designed "*to reduce cash outlays from mortgage purchases*" while supporting the mortgage market (GNMA Annual Report 1975, p. 15). Rather than referring to a specific plan or round of purchases, 'Tandem' referred more to a general approach of making subsidized loan purchases and resales *in tandem*, to minimize the program's appearance on the federal budget balance. As CEA staff economist George von Furstenburg explained to the Senate Committee on Banking, Housing, and Urban Development: "*Tandem or piggyback procedures were first introduced in 1968 partly to minimize the effect of federally assisted mortgage credit programs on the unified budget balance. Since the net lending of government agencies represents an outlay above the line, GNMA's acquisition of below-market interest rate mortgages increased the budget deficit by the full amount of the purchase price. Under tandem, these mortgages were resold to the private market at a price sufficiently below par to afford a normal return to investors. Thus only the discount or the present value of the interest subsidy represented an outlay and the cycle could continue 'in tandem' with further purchases*" (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 82).[129]

To bolster support for certain classes of less attractive FHA mortgages, the Housing and Urban Development Act of 1969 amended Section 305 of the NHA to provide statutory authorization for GNMA to make special assistance purchases "*at a price equal to the unpaid principal amount thereof at the time of purchase, with adjustments for interest and any comparable items, and to sell such mortgages at any time at a price within the range of market prices for the particular class of mortgages involved at the time of sale as determined by the Association*" (Sec. 115), a convoluted way of opening the door to subsidized purchases of FHA/VA mortgages. The

[129]GNMA's 1975 Annual Report, however, instead framed the term as referring to cooperation between the public and private sector: "*the Government and the private sector can be said to be working in 'tandem' to provide support to the mortgage market and the housing industry*" (GNMA Annual Report 1975, p. 15).

conference report described this section of the enacted bill as the "*GNMA ('Tandem') Plan*," which "*would authorize GNMA to purchase certain mortgages at par for subsequent resale at the market price to FNMA or others*" (House Committee on Banking and Currency (1969b), p. 28). The accompanying Senate committee report had explained that "***under present mortgage market conditions**, FHA-insured mortgage loans can only be made at heavy discounts. As a result, many potential sponsors, particularly of section 236 rental and cooperative housing and section 221(d)(8) rent supplement housing, have been discouraged from sponsoring such housing or have done so at great financial sacrifice*" (Senate Committee on Banking and Currency (1969), p. 11).

Under the various Tandem programs, Ginnie Mae would commit to purchase mortgages for new home construction at a pre-specified (typically subsidized) interest rate, purchase those mortgages as the home sales were completed, and then auction off the mortgages at prevailing interest rates—doing so relatively quickly, to keep a minimal impact on federal outlays (Nixon (1974)). GNMA's Tandem commitments were generally priced 100 to 200 basis points below the market (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 79). When GNMA's resale price was below the purchase price, the subsidy cost would be passed along to the federal budget balance. The Tandem programs thus allowed Ginnie Mae to effectively operate its special assistance functions as a revolving fund for a credit subsidy. The perceived advantage of the program was locking in a favorable interest rate and reducing uncertainty for the buyer, lender, and home builder. Tandem programs were initially targeted toward subsidized mortgage programs for low-income homebuyers, particularly in multifamily units (FHA's Section 221(d)(3), 235, and 236 loan programs), but the purchase program was extended to all unsubsidized

FHA mortgage insurance and VA mortgage guarantee programs in September 1971 (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 82). The only restrictions on GNMA's Tandem loan commitments was that the newly constructed homes qualify for FHA/VA insurance, and that the loan balance fall under a loan limit.

In addition to citing concerns about "*present mortgage market conditions*," the Senate committee report noted that the bill did "*not include any new far-reaching programs*" and framed the bill as making economically motivated funding adjustments to the 'comprehensive' housing bill enacted the previous year: "*The most significant part of the committee bill involves the dollar authorizations to fund the programs through fiscal year 1972. In general, the committee authorized funds to continue the programs at existing levels, but raised the amount authorized to take into account new program authority,* ***increased costs, and increased interest charges***" (Senate Committee on Banking and Currency (1969), pp. 1–2, 9). High and rising interest rates had also been cited as a concern during the Senate's hearings on the bill (CQ (1970)). Whereas the HUDA of 1968 evolved from a slew of related bills dating back to 1965, the HUDA of 1969 was drafted in just a few months and was much shorter-term in scope.[130] Moreover, the bill was fully drafted and then enacted in the midst of the credit crunch enduring from 1969Q1 through 1970Q1. Given the timing of enactment and congressional concern with prevailing mortgage market conditions, we classify the policy change as cyclically motivated.

Emergency Home Finance Act of 1970 (Pub. L. 91-351)

Enacted: July 24, 1970

[130]The Senate Committee on Banking and Currency held hearings in July 1969, and the bill was first reported on September 23, 1969, less than three months before its passage.

See listing under FNMA (Sec. 3.4.1) for economic context and legislative background.

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$0.38 billion
News:	July 1970
Effective:	July 1970
Classification:	Cyclical

The Act authorized Fannie Mae to expand secondary market operations to the conventional mortgage market and charted Freddie Mac to serve as a secondary market for the FHLBS (see listings under FNMA, Sec. 3.4.1, and FHLMC, Sec. 3.4.2). The Act also loosened the requirement that Ginnie purchase mortgages at par value under its Section 305(g) special assistance program for low- and moderate-income housing. And the Act increased Ginnie's Section 305(c) general Presidential special assistance authorization by $1.5 billion, by amending a prior increase of $500 million, effective July 1, 1969, up to $2 billion. Part of this increase was offset by decreasing the authorization for Section 305(g) special assistance functions by $750 million, to $1.75 billion, effective upon enactment. Thus the Act's net impact across all special assistance authorities was a $750 million increase, again effective upon enactment. Using the two-year rule, we assign an annualized increase in Ginnie Mae's purchase capacity of $375 million in the year starting July 1970.

Testifying before the Senate Committee on Banking and Credit on March 3, HUD Secretary Romney had identified the administration's objective of delivering "$*20.5 billion of net new mortgage credit needed to finance 1.4 million* ***housing***

starts," to be advanced by the transfer and $1.5 billion net increase of GNMA special assistance funds, GNMA MBS issues, and a FHLBank subsidy to members (CQ (1971)). The accompanying Senate committee report explained that the Section 305(g) program had an unused balance of over $2 billion, which with the reallocation of funds and loosened restrictions on the program, "*could be made* ***immediately available*** *upon enactment of this bill to* ***support the badly sagging FHA single-family construction program***" (Senate Committee on Banking and Currency (1970), p. 10), suggesting that our estimate for the impact on GNMA purchases is likely on the conservative side.

President Nixon had proposed simply reshuffling $1.5 billion from the congressional Section 305(g) allocation to the Section 305(c) general Presidential special assistance authority allocation. The Senate version of the bill would have reallocated $750 million in special assistance funds from the congressional to presidential allocations, whereas the House version of the bill left the congressional special assistance fund untouched, and proposed $1.5 billion in new, additional funds for the presidential allocation (CQ (1971), House Committee on Banking and Currency (1970)). As the net increase of $750 million in special assistance authority resulting half from reallocated funds and half from new authorizations was only agreed upon in conference, we date the news of the increase as being made public in July, when the conference report was agreed to in committee and both chambers.

The Act was drafted and enacted in a relatively short timeframe.[131] Moreover, funds were being retargeted from the more long-term policy oriented

[131]The bill was considered and passed by the Senate on April 16, an amended version was passed by the House on June 25, the Senate rejected the House amendment and requested a conference at the end of June, and the Senate and House agreed to the conference report on July 17 and July 20, respectively.

congressional allocation to the more cyclically oriented presidential allocation. Given the clearly stated motivations of 'immediately' supporting the housing market and the bill's enactment in the midst of the recession lasting from December 1969 through November 1970, we classify this expansion of Ginnie's special assistance purchase authority as cyclically motivated. Legislative background, economic context, and this classification are discussed at more length in the Act's listing under FNMA (see Sec. 3.4.1).

Tandem Program for FHA/VA Loans

Announced: September 19, 1973—May 10, 1974

Policy Change:	FHA/VA Tandem Authorization
Agency:	GNMA
Impact:	$1.5 billion
News:	Sep. 1973
Effective:	Sep. 1973
Classification:	Cyclical
Policy Change:	FHA/VA Tandem Authorization
Agency:	GNMA
Impact:	$3.3 billion
News:	Jan. 1974
Effective:	Jan. 1974
Classification:	Cyclical
Policy Change:	FHA/VA Tandem Authorization
Agency:	GNMA
Impact:	$1.65 billion
News:	May 1974
Effective:	May 1974
Classification:	Cyclical

On January 5, 1973, President Nixon ordered a moratorium on all federal housing subsidy programs, including the FHA Section 235 (homeownership for lower-income families) and Section 236 (rental and cooperative housing) programs that had been supported by Ginnie Mae's Tandem program to date (CQ (1974)). In his State of the Union Address on housing and community development that March, Nixon announced the administration was undergoing a comprehensive overview of HUD programs and would make recommendations re-

garding the halted programs within six months.[132] The emphasis of the speech and intended overhaul was addressing perceived inefficiencies and inequities in HUD programs, and there was no mention of mortgage market conditions (Nixon (1973a)).

But the administration's focus quickly shifted, and President Nixon announced a series of legislative and administrative proposals on September 19, 1973 primarily intended to ease the prevailing tight mortgage market conditions and improve low-income housing. Nixon stated that "*First, we are **facing certain problems in providing adequate housing credit**–and we must **move promptly** to resolve them. Second, too many low-income families have been left behind: they still live in substandard, overcrowded and dilapidated housing–and we must help them meet their needs*" (Nixon (1973b)). It was announced that the housing program moratorium was being lifted and HUD was authorized both to reinstate GNMA's Tandem plan and make up to $3 billion in commitments and purchases of mortgages for new home construction at subsidized interest rates. This was an unprecedentedly large release of Presidential special assistance authority. The FHLBanks were also authorized to make forward commitments of up to $2.5 billion at a predetermined interest rate to member savings and loan associations. The President also requested that Congress raise the maximum amount of a mortgage loan insurable by the FHA and purchasable by GNMA, and a reduction of FHA downpayment requirements, among other legislative proposals (Nixon (1973b)).

On January 21, 1974, President Nixon authorized GNMA to purchase up

[132]That speech reaffirmed the administration's commitment to the overarching goal of US housing policy of "*a decent home and a suitable living environment for every American family*" enshrined by the National Housing Act of 1949, and touted that "*the percentage of Americans living in substandard housing has dropped dramatically from 46 percent in 1940 to 37 percent in 1950 to 18 percent in 1960 to 8 percent in 1970*," aided by federal programs (Nixon (1973a)).

to $6.6 billion worth of FHA/VA home mortgages at an interest rate of 7.75%, estimated to support roughly 200,000 housing unit purchases. A third authorization made on May 10 allowed purchases of up to an additional $3.3 billion at an interest rate of 8.0%, supporting another 100,000 units (Nixon (1974)), but this authority was not used until October, when the prior authorization had been fully expended. As no additional Congressional authorization was needed for any of these three major releases of general Presidential special assistance authority, we consider the news of each release as being made public on the President's first announcement. Using the two-year rule, we assign annualized increases in GNMA's purchase capacity of $1.5 billion in September 1973, $3.3 billion in January 1974, and an additional $1.65 billion in May 1974.

In a May 10 statement about plans to revitalize the housing market, Nixon clearly outlined cyclical motives for the Tandem reauthorization and broader housing stimulus agenda: "*The higher cost of money affects all sectors of the economy, but none more directly than the housing market... With this shrinkage of available housing funds, home buyers are either unable to find mortgage money, or the mortgages that are available are offered on terms which fewer families can meet. The home builder finds it increasingly difficult to sell the homes he has already built, and with the* ***uncertainties of the availability of such mortgage funds****, he is understandably reluctant to produce more housing.* ***As builders curtail operations, workers in the construction trades face the prospect of increased unemployment***" (Nixon (1974)). Nixon also stated that "*The Tandem Plan is a very useful instrument for* ***supporting the housing market in times of credit stringency***" (Nixon (1974)). Given the President's explicitly cyclical concerns and the timing of the authorizations just before and during the recession of November 1973 through March 1975, we classify Tandem reinstatement and all three of these releases of Presi-

dential special assistance authority as cyclically motivated.

Emergency Home Purchase Assistance Act of 1974 (Pub. L. 93-449)

Enacted: October 18, 1974

Policy Change:	Brooke-Cranston Tandem Program
Agency:	GNMA
Impact:	+$3.88 billion
News:	Oct. 1974
Effective:	Oct. 1974
Classification:	Cyclical

The Act amended Section 313 onto the NHA to establish a statutory Tandem program for the subsidized purchase of conventional mortgages, commonly referred to as the Brooke-Cranston Tandem program or 'emergency special assistance authority.'[133] The Act authorized the HUD Secretary to instruct GNMA to make emergency mortgage commitments and purchases "*whenever the Secretary finds* ***inflationary conditions and related governmental actions*** *are having a severely disproportionate effect on the housing industry and the resulting* ***reduction in the volume of home construction or acquisition threatens seriously to affect the economy*** *and to delay the orderly achievement of the national housing goals...*" (Sec. 3(a)). The Act authorized GNMA to make purchases and commitments of up to $7.75 billion outstanding at any given time under the Brooke-Cranston Tandem program, above and beyond GNMA's authority to purchase certain FHA/VA mortgages under its existing special assistance functions. The new $7.75 billion authorization was effective upon enactment but set to expire after one year,

[133]The program was coined after Senator Alan Cranston and Senator Edward Brooke, sponsors of the Senate version of the bill.

save purchases needed to honor prior commitments and for the provision of liquidations.

Unlike the previous Tandem programs primarily directed toward specific classes of FHA/VA mortgages promoting low-income housing, the Brooke-Cranston program was primarily intended "*as an* ***emergency device for stabilizing the housing market against cyclical downturns***" by stimulating housing construction (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 1). On the HUD Secretary's order, GNMA was to issue commitments to purchase conventional mortgages from originators, though qualifying mortgages were limited to an 80% LTV ratio and $42,000 loan limit, well below the prevailing conforming loan limit. Under a HUD regulation, at least 90% of the mortgages had to be for new home purchases, completed after October 1973, and not previously owned by a homeowner (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 14). As a secondary objective, the program was intended to improve home buying opportunities for households otherwise unable to purchase a home. Interest rates were set at the average yield on issues of 6-to-12-year Treasury bonds in the month preceding the commitment date, plus administrative costs (Senate Committee on Banking, Housing and Urban Affairs (1976b), pp. 13–14). And for legal reasons, Freddie and Fannie served as agents for GNMA in its purchases of below-market rate conventional mortgages, with each institution allocated roughly half of the funds for conventional mortgage purchases (Senate Committee on Banking, Housing and Urban Affairs (1976b), p. 14).

On the day of enactment, the HUD Secretary authorized $3 billion worth of commitments and purchases of conventional mortgages at an interest rate of

8.5% (Economic Report of the President 1975, p. 72). After this authority had been expended, an additional $3 billion was authorized for mortgages at an interest rate of 7.75% on January 16, 1975, including $1 billion for the purchase of FHA/VA mortgages. The terms were overly attractive, and the entirety of this authorization was exhausted on January 22. A final authorization of $2 billion was made in August 1975.[134] While the authorization was scheduled to expire after one year, subsequent purchases were allowed to fulfill commitments made in the program's first year; extensions of such authorization sunsets also had considerable precedent and the program was indeed repeatedly reauthorized before expiring in 1981 (see below). Accordingly we deem the two-year rule most appropriate for GNMA commitment authorizations under the Brooke-Cranston program, and assign a $3.875 billion annualized increase in GNMA's purchase capacity, measured as half of the $7.75 billion statutory limit outstanding for the program. We classify news of Ginnie's new conventional mortgage purchases under the Brooke-Cranston program as having been made public in October 1974, when the bill cleared both chambers and the HUD Secretary acted immediately upon its enactment.

The bill was clearly enacted in response to depressed housing market conditions, with the accompanying Senate Committee report stating that the bill "***responds to a mortgage credit crisis*** *which has crippled the residential real estate industry in the United States. Housing activity in the Nation is severely depressed*" (Senate Committee on Banking (1974a), p. 1). The Act also began with the three following 'findings' of Congress: "*(1) in many parts of the Nation, residential mortgage credit is or is likely soon to become prohibitively expensive or unavailable at any price; (2) the* ***unavailability of mortgage credit severely restricts housing produc-***

[134]The three authorizations exceeded the $7.75 billion statutory limit outstanding in response to cancelled prior commitments.

tion**, causes hardship for those who wish to purchase or sell new and existing housing, and delays the achievement of the national goal of a decent home for every American family; and (3) there is an **urgent need to provide an alternate source of residential mortgage credit on an emergency basis**"* (Sec. 2). The bill was drafted and passed in a remarkably short time frame, from first being introduced in Senate committee on September 10 to passing the Senate on October 10 and the House on October 15, and President Ford thanked "*Congress for **responding so quickly" to "*provide a **shot in the arm for the housing industry***" (Ford (1974a)). We classify the establishment of the Brooke-Cranston Tandem program as cyclically motivated.

Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1976 (Pub. L. 94-116)

Enacted: October 17, 1975

Policy Change:	Brooke-Cranston Tandem Increase
Agency:	GNMA
Impact:	+$2.5 billion
News:	Oct. 1975
Effective:	Oct. 1975
Classification:	Cyclical

The Emergency Housing Act of 1975 (Pub. L. 94-50), enacted July 2, 1975, authorized up to an additional $10 billion for emergency commitments and conventional mortgage purchases under the Brooke-Cranston Tandem program authorized under Section 313(g) of the NHA, subject to appropriations. The Act also permitted GNMA to purchase conventional mortgages on multifamily properties and individual condominium units, and expanded the pool of eligi-

ble purchases to include all FHA-insured mortgages in addition to conventional mortgages. And the Act rescinded authorization from any remaining uncommitted funds from the prior $7.75 billion authorization, effective October 18, 1975, unless approved by an appropriations bill.

The Department of Housing and Urban Development-Independent Agencies Appropriation Act for Fiscal Year 1976 (Pub. L. 94-116) authorized up to an additional $5.0 billion for purchases and commitments to purchase mortgages under the Brooke-Cranston Tandem program, above and beyond prior authorizations, which were extended beyond their October 18 sunset. GNMA was allowed to borrow from the Treasury as needed to meet obligations under this amended authorization. Using the two-year rule, we assign an annualized increase of $2.5 billion in GNMA's ability to purchase mortgages, starting October 1975, when the appropriations bill cleared the way for additional funds to be released. The HUD Secretary made $3 billion available in January 1976, and the remaining $2 billion was released in September 1976 (Senate Committee on Banking, Housing and Urban Affairs (1978), p. 25).

The committee report accompanying the Senate bill explained that the House provided for no additional Brooke-Cranston authorization, as the administration had yet to request such funds when the House acted in June (Senate Committee on Appropriations (1975), p. 20). Pursuant to the administration's budget request, the Senate version of the appropriations bill, which passed in July, would have authorized up to an additional $5 billion for the Brooke-Cranston program (Senate Committee on Appropriations (1975), p. 21). During conference, the House managers receded and agreed to a Senate amendment authorizing only an additional $5 billion (House Committee on Appropri-

ations (1975), p. 10). We date the news of the Brooke-Cranston Tandem program expansion to the conference report, which both chambers agreed to on October 3, 1975.

The Senate committee report accompanying the HUD-Independent Agencies Appropriations Act stated that the objective of the $10 billion increase in the Brooke-Cranston Tandem authorization provided by the Emergency Housing Act was "*to* ***help support an increase in residential construction and thus provide jobs, reduce unemployment and stimulate the economy***" (Senate Committee on Appropriations (1975), p. 20). The release of the funds by the HUD Secretary was again conditional on a finding that a "***reduction in the volume of home construction or acquisition threatens seriously to affect the economy***." Given both the economic stimulus motives of the increased purchase authorization the overarching intent behind the Brooke-Cranston Tandem program (see above), we classify the policy change as cyclically motivated.

Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1978 (Pub. L. 95-119)

Enacted: October 4, 1977

The appropriations Act limited GNMA's Section 305 special assistance authorizations to make commitments and purchases out of recaptured purchase authority to $2 billion, without fiscal year limitation. Recaptured purchase authority was that generated by GNMA's portfolio sales, repayments, and commitment cancellations, and which circumvented the need for new budget authority. Prior to enactment, there was no limitation on how much recaptured special assistance authority could be used for new purchases. The policy change was made in the broader context of Congress trying to tighten control over fed-

eral credit subsidies and loan guarantees, and budget process reforms more generally.

Both the House and Senate bills would have initially barred all default use of GNMA's recaptured special assistance authority, clarifying that "*any loan or mortgage commitments made out of receipts of corporate funds, previously released in appropriations acts and subsequently recaptured, may not be reused without further appropriations action unless otherwise required by law*," further explaining that the provision was "*in agreement with the intent of the Congressional Budget and Impoundment Control Act that control be exercised over corporate receipts*" (House Committee on Appropriations (1977), p. 58). The conference bill added an amendment allowing up to $2 billion of recaptured special assistance purchase authority to be used. We could not find, however, any related explanation for the amendment in the conference agreement increasing special assistance authority via recaptured funds. It is also unclear how much recaptured special assistance authority was being used by Ginnie Mae ahead of this policy change. We thus consider this policy change as setting a baseline for current policy with respect to Ginnie's special assistance functions, instead of classifying it as a binding, significant policy change.

Housing and Community Development Act of 1977 (Pub. L. 95-128)

Enacted: October 12, 1977

See listing under FNMA (Sec. 3.4.1) for economic context and legislative background.

Policy Change:	Brooke-Cranston Tandem Expansion
Agency:	GNMA
Impact:	+$3.75 billion
News:	Oct. 1977
Effective:	Oct. 1977
Classification:	Non-Cyclical

The Act extended the authorization of the Brooke-Cranston Tandem program under Section 313 of the NHA for one year, through October 1, 1978. The Act capped purchases and commitments to purchase under that authority at $7.5 billion for FY1978, which was not conditional on appropriations. The Act also expanded the purpose of the emergency special assistance program authorized by Section 313 of the NHA from solely economic stabilization to also promoting home ownership for moderate-income households, with the following language amended onto that Section's purpose: "*To the extent feasible and consistent with the primary purpose of this section to stabilize housing production, the Secretary may direct the exercise of the authority conferred by this section to* ***promote homeownership opportunities for moderate-income families***" (Sec. 407(a)). The Act also gave the HUD Secretary more flexibility in targeting purchases towards urban areas and housing rehabilitation.

The accompanying Senate Report explained that the $7.5 billion purchase ceiling for FY1978 "*does not constitute a new [budget authority] authorization, but rather places a limit on the amount which GNMA may use in the next fiscal year from funds which have previously been authorized. Since the program's enactment in 1974, Congress has authorized $17.750 billion, most of which has been used to purchase mortgages, and much of which has been recouped by the Federal Government when the loans*

were sold off... The Administration has proposed an amendment, currently pending before the Committee on Appropriations, which would prohibit GNMA from rolling over the program funds in this manner, in order to establish greater financial control. The Committee concurs that there is a need to establish an explicit congressional authorization for permitting re-use of recaptured funds, and has, therefore, set a $7.5 billion dollar ceiling in FY 1978. The Committee has taken this action as means of placing a limit on the use of previous authorizations, rather than as authorizing new budget authority" (Senate Committee on Banking, Housing and Urban Affairs (1977), pp. 30–31).

Since the enacted ceiling on rolling over previously authorized funds was looser than the administration's proposal to bar any roll over, and its design deliberately circumvented being subject to appropriating new budget authority—counter to prior authorizations—we view this amendment as increasing GNMA's purchase capacity rather than merely continuing current policy. And because the Brooke-Cranston Tandem program had been created as a temporary emergency power with purely cyclical motivations, the program was considerably repurposed by the Act, substantially changing the composition of GNMA's purchase capacity. While the authorization was scheduled to expire after one year, subsequent purchases were authorized to fulfill commitments made in the first year's authorization, and there was precedent for such sunsets being repeatedly extended as a matter of current policy (see above). Consequently we apply the two-year rule, scoring the impact as increasing annualized purchase capacity by $3.75 billion for the year starting October 1977.

The House version of the bill, passed in May, contained neither the permissible limit of up to $7.5 billion in purchases for FY1978, nor the HUD Secretary's expanded authority to use the Tandem program to promote middle-income

homeownership or support urban areas and housing rehabilitation (House Committee on Banking (1977b), pp. 68–69). As these provisions were only agreed upon in the conference report, we determine news of the policy to having been made in October 1977, when both chambers agreed to that report.

The economy was experiencing neither a recession nor a credit crunch when the Tandem program was reoriented toward housing policy objectives for low- and moderate income households as well as urban areas. The 1977 Annual Report of the Federal Reserve Board described a robust housing market: "*Residential construction remained a strong expansive force in 1977. A vigorous sales pace in housing markets stimulated a further, major increase in homebuilding activity during the year. Private housing starts were at an annual rate of 2.1 million units in the final quarter, and for the year as a whole they totaled nearly 2 million, the most since 1973*" (Annual Report of the Federal Reserve Board 1977, p. 5). The amendment was also made in the context of a broader housing bill focused on longer-term policy goals, as opposed to emergency responses or depressed housing conditions. We thus classify the policy change as unrelated to the business or financial cycle. Economic and legislative background as well as the justification for this classification is discussed at more length in the Act's listing under FNMA (see Sec. 3.4.1).

Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1979 (Pub. L. 95-392)

Enacted: September 30, 1978

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$1.0 billion
News:	Sep. 1978
Effective:	Oct. 1978
Classification:	Non-Cyclical

The appropriations bill increased the limitation on emergency special assistance purchases and commitments pursuant to Section 313 of the NHA by $1 billion, to be paid from recaptured purchase authority. The administration had not requested an increase in the authorization for the Brooke-Cranston Tandem program, and the House bill had not recommended it, but the Senate Appropriations Committee recommended granting "*stand-by authority to commit these funds in the event that a depressed housing market threatens to lower housing production, especially in the multifamily area*" (Senate Committee on Appropriations (1978), p. 13). In the conference bill, the House and Senate compromised on a standby increase of $1 billion for the Tandem program, but added language instructing that "*the funds not be made available in the absence of a recession in the housing industry*" (House Committee on Appropriations (1978), p. 6).[135]

The Act also further increased special assistance authority under Section 305 of the NHA by $2 billion, of which $1.5 billion could be made from recaptured special assistance purchase authority and the remaining $500 million from new borrowing authority. There was no fiscal year limitation accompanying this authorization. The net $2 billion in new purchase authority had been requested

[135]The Senate version of the bill had proposed a $4 billion increase in the Brooke-Cranston Tandem authorization. The conferees' report language set a higher bar for releasing this authority than the standing requirement of a finding by the HUD Secretary that inflation and the federal government's response was adversely affecting the housing industry (see above).

by GNMA and the President's budget, primarily to fund the planned purchase of new and heavily rehabilitated housing for low- and moderate-income households. The $1.5 billion authorization from recaptured purchase authority was above and beyond the $2 billion cap to such funds enacted by the Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1978 (see above), so we consider it a significant policy change instead of a continuation of current policy for special assistance functions.

In conjunction with the appropriations bill, the Housing and Community Development Amendments of 1978 (Pub. L. 95-557), enacted October 31, 1978, extended authorization for the Brooke-Cranston Tandem program under NHA Section 313 for one year, through October 1, 1979. The latter Act also increased general special assistance authority by $500 million on October 1, 1978, subject to approval by an appropriations bill (as had just been approved). The Housing and Community Development Amendments of 1978 also substantially increased GNMA's loan limits for purchases of FHA/VA mortgages to $55,000 for single-family homes and up to $68,750 for four-unit homes, previously set at $33,000 and $40,500, respectively.

According to the accompanying Senate committee report, the $1.5 billion authorization from recaptured purchase authority was intended to "*support the production of approximately 50,000 new and substantially rehabilitated housing units for low- and moderate-income families assisted under the section 8 program*" (Senate Committee on Appropriations (1978), p. 13). The other $500 million increase was to be used for a 'Targeted Tandem' program for "*mortgages on projects located in distressed cities and neighborhoods which are undergoing or showing prospects for revitalization*" (Senate Committee on Appropriations (1978), p. 13). The purchases

were to bear below-market interest rates as low as 7.5%, more than two percentage points below prevailing 30-year conventional fixed-rate mortgages.[136]

The economy was not in recession, but had just entered the credit crunch lasting from 1978Q2 through 1982Q4 when the bill was enacted. The 1979 Economic Report of the President, however, suggested that housing and mortgage market conditions were holding up quite well, and construction was at capacity, despite rising interest rates in the second half of the year: "***Housing activity remained on a plateau throughout last year***, *following nearly 3 years of steady advance. Real residential construction, on a calendar year basis, was 3.5 percent above that in 1977, and there were 2.0 million housing starts last year... This leveling of housing starts and residential construction in 1978 was* ***not surprising***. *Three years of strongly rising building activity had filled backlogs of demand created by the depressed level of new construction during the 1973-74 period of credit restraint and low income. Moreover, the sharp rise in prices of a wide range of building materials* ***suggests that the building industry was operating at close to capacity in 1978***. *Indeed, the striking feature of the housing sector last year was its* ***continued high level of activity in the face of sharply rising interest rates***" (Economic Report of the President 1979, p. 31). The 1978 Annual Report of the Federal Reserve Board similarly noted the strength of the housing market through the end of 1978, explaining that "*the sustained strength of residential construction activity apparently reflected both the appeal of housing investment as a hedge against inflation and the improved ability of mortgage markets to withstand tightening financial conditions*" (Annual Report of the Federal Reserve Board 1978, pp. 5, 8–9).

Because there was no imminent downturn in the housing market at the time,

[136]The report also noted that "*the net outlay per $1,000,000,000 of mortgage purchase authority exercised is only $150,000,000 or so*" (Senate Committee on Appropriations (1978), p. 13).

we do not consider the conditional standby emergency special assistance authorization to be a binding increase in purchase capacity. Using the two-year rule, we assign a $1 billion annualized increase in Ginnie's purchasing capacity from the Section 305 special assistance authority increase of $2 billion, as measured on a current policy basis. Because of substantive differences between the House and Senate versions of the bill regarding the top-line increase in GNMA's Tandem and special assistance programs (see above), we date news of the net increase as being dated to the agreement of the House and Senate to the conference report on September 19 and September 20, respectively.

The increase in general special assistance authority was distinctly oriented toward specific social policy objectives related to low-income housing, notably supporting urban revitalization and construction of multifamily housing for HUD's Section 8 low-income housing program. Moreover, the conditional increase in the Brooke-Cranston Tandem purchase authority served as an insurance policy in the event of a recession, suggesting that policymakers were not intending the general special assistance increase to also serve a contingent countercyclical role. The GNMA special assistance authority budget request in the FY1979 Budget emphasized supporting FHA programs with below-market interest rates, and made no mention of economic conditions or cyclical motives (The Budget for Fiscal Year 1979 Appendix, p. 493). The bill eventually just met the administration's request, which was made on January 20, 1978, predating the credit crunch, without any adjustment for subsequent economic trends. We thus classify the unconditional increase in Section 305 purchase authority as unrelated to the business or financial cycle.

Department of Housing and Urban Development-Independent Agencies Ap-

propriation Act, 1980 (Pub. L. 96-103)

Enacted: November 5, 1979

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$1.0 billion
News:	July 1979
Effective:	Nov. 1979
Classification:	Non-Cyclical

The Act again further increased the Section 305 general special assistance authorization by $2 billion, to be funded entirely out of recaptured special assistance purchase authority. There was no fiscal year limitation accompanying this authorization. The additional $2 billion in purchase authority had been requested by GNMA and the President's budget, with $1.5 billion earmarked for the planned purchase of new and heavily rehabilitated housing for low- and moderate-income households, particularly through Section 8 housing assistance. The remaining $500 million was intended for the Targeted Tandem program for mortgage purchases related to urban revitalization in distressed cities (Senate Committee on Appropriations (1979), p. 15). The fiscal year had already started October 1, 1979, so this authorization was effective upon enactment. Using the two-year rule, we assign a $1 billion annualized increase in Ginnie's purchasing capacity from the Section 305 special assistance authority increase of $2 billion, as measured on a current policy basis. The Senate version of the bill, passed July 27, concurred with the GNMA special assistance authorization in the House version previously passed on June 27, hence we date the news of the increase as being made public in July 1979, as opposed to the House and Senate agreeing to the conference report on October 24.

The economy was not in a recession, but had entered the credit crunch lasting from 1978Q2 through 1982Q4 when the bill was enacted. The 1980 Economic Report of the President offered the following overview of housing and mortgage market conditions: "*The decline in residential construction in 1979 was about in line with expectations at the beginning of the year, although interest rates increased much more than had been anticipated. For the year as a whole, real residential construction was 6 percent below the high 1978 level, and new housing starts fell to about 1.74 million units from 2 million in the previous year... The rising cost of mortgage and construction financing depressed housing sales and starts only moderately until late in the year... Following Federal Reserve action in early October to tighten monetary policy, mortgage interest rates rose sharply, reaching levels well above usury limits in many States*" (Economic Report of the President 1980, pp. 43–44).

The authorization of funds was, however, focused on longer-term policy toward urban revitalization and affordable housing for lower- and moderate-income households, particularly the Carter administration's prioritization of expanding Section 8 housing.[137] Moreover, the appropriations committee merely met the administration's budget request submitted January 22, 1979, with no adjustment for the subsequent changes in housing and mortgage market conditions. We thus classify the authorization as unrelated to the business cycle.

Housing and Community Development Amendments of 1979 (Pub. L. 96-153)
Enacted: December 21, 1979

Among many other provisions, the Act waived GNMA's Section 305 special assistance program loan limits, to allow for the purchase of any loan insured

[137] In particular the Housing and Community Development Acts of 1977 and 1980 significantly expanded Section 8 housing programs, and the Housing and Community Development Amendments of 1979 expanded GNMA's purchase capabilities with respect to Section 8 housing (see below).

under a number of targeted FHA programs when at least 20% of the mortgages fell under Section 8 of the National Housing Act. The stated purpose of the bill in its preamble was "*[t]o amend and extend certain Federal laws relating to housing, community and neighborhood development and preservation, and related programs, and for other purposes*," and the bill very much suggested that the stance of US federal housing policy was focused on longer-term distributional and social insurance motives, as opposed to cyclical concerns. We do not consider this a binding, significant policy change affecting Ginnie's purchase capacity, merely a modest change in the pool of mortgages eligible.

Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1981 (Pub. L. 96-526)

Enacted: December 15, 1980

Policy Change:	Special Assistance Decrease
Agency:	GNMA
Impact:	-$0.2 billion
News:	Sep. 1980
Effective:	Dec. 1980
Classification:	Cyclical

The Housing and Community Development Act of 1980 (Pub. L. 96-399), enacted October 8, 1980, extended the authorization for the Brooke-Cranston Tandem program under Section 313 of the NHA for one year, through October 1, 1981. The authorization was subsequently allowed to expire. Eligible purchases under the Brooke-Cranston Tandem program were expanded to also include mortgage-related securities. The Act also increased GNMA's Section 305(c) general Presidential special assistance authority by $900 million, effective

October 1, 1980, again subject to approval in an appropriation act.[138]

Two months later, the corresponding Department of Housing and Urban Development-Independent Agencies Appropriation Act for FY1981 authorized a $1.8 billion loan limitation—as opposed to an authorization via recapture of payments—to fund commitment contracts and purchases under the NHA Section 305 special assistance program during FY1981, as well as additional obligations as necessary to meet prior years commitments.[139] The fiscal year had already started October 1, 1980, so this authorization was effective upon enactment. The budget had requested $1.8 billion in mortgage purchase authority for FY1981, which was earmarked for the Section 8 Tandem program and, to a lesser extent, the Targeted Tandem program for middle-income housing in distressed urban areas. The enacted loan limit represented a decrease of $200 million in GNMA's authority relative to current policy (see above). The Senate version of the bill, passed September 23, concurred with the GNMA special assistance authorization in the House version previously passed on July 28, hence we date the news of the increase as being made public in September 1980, as opposed to the House and Senate agreeing to the conference report in December 1980.

The appropriations act also authorized GNMA to make new commitments of up to $53 billion in FY1981 to issue MBS guarantees to carry out the purposes of Section 306 of the NHA—the first statutory limitation of its kind.[140] Previously, commitments to issue guarantees had been authorized in any such

[138]See accompanying House Committee on Banking report for complete history of Sec. 305(c) revisions to general Presidential special assistance authority (House Committee on Banking (1980), p. 186).

[139]This authorization overhaul was again the result of ongoing budget process and credit program reforms. The President's FY1981 Budget had proposed subjecting all federal credit programs to annual reviews and authorizations through appropriations language (Senate Committee on Appropriations (1980), p. 5).

[140]Ibid.

amounts as necessary to meet the objectives of the NHA, as amended. The authorization set by the Act matched the projected level of commitments and authorization request in the president's budget for FY1981 (The Budget for Fiscal Year 1981 Appendix, p. 524).

The first emphasis of the 1981 Economic Report of the President was that "*[w]e must find ways to bring down a stubborn inflation without choking off economic growth*" (Economic Report of the President 1981, p. 3), and Congress was trying to keep discretionary spending and program levels in check to fight inflation. The FY1981 Budget also proposed a trial $30 million grant program to assist in the financing of multifamily home construction as "*an experimental shift from the current mode of financing targeted tandem projects—a tandem program involving the purchase and sale of mortgages—to an interest rate reduction approach... a grant would be given to the lender as compensation for making a below-market interest-rate mortgage loan... The capital grant may accomplish the same purpose, without ever having to purchase, hold, and subsequently sell the mortgage*" (The Budget for Fiscal Year 1981 Appendix, p. 519). The appropriations committees rejected the administration's proposed trial interest rate subsidy program, signaling a shift in housing policy priorities from social policy objectives to budgetary and inflationary concerns. The accompanying Senate committee report explained that its refusal "*is not intended to be a condemnation of the program or its merits. Rather the Committee believes that it is inappropriate to start a new program at a time when* ***every effort is being made to eliminate the budget deficit as a means of fighting inflation***" (Senate Committee on Appropriations (1980), p. 17).[141] The appropriations bill also cut all agencies of jurisdiction, save the VA, by at least 2%, with Congress deliber-

[141]The 1981 Economic Report of the President had similarly emphasized the imperative that "*Our monetary and fiscal policies must apply steady anti-inflationary restraint to the economy*" (Economic Report of the President 1981, p. 8).

ately appropriating less than the administration's top-line budget request, again representative of cyclical budgetary and inflationary concerns (CQ (1981)).[142]

The request for increased GNMA special assistance authority was made on January 28, 1980, early in the recession lasting from January through July 1980. The appropriations bill was enacted during the briefly ensuing expansion before the more severe recession from July 1981 through November 1982. The 1981 Economic Report of the President noted that "*[h]ousing and automobile sales were the key sectors of weakness, accounting for about two-thirds of this drop in final demand*" in the first recession (Economic Report of the President 1981, p. 136). The report noted that "*Federal and related agencies provided only modest support to the mortgage market as compared with the last cyclical downturn*" (Economic Report of the President 1981, p. 141), but also that the "*chief cyclical determinant of housing activity has become interest rates rather than credit availability. As events have demonstrated, however, [the development of secondary markets] did not insulate housing from tighter monetary conditions.*" Housing starts bottomed out in May 1980, but after a short summer rebound, weakness in the housing market remerged in the fourth quarter. Moreover, the *CQ Almanac* noted that cyclical concerns about the housing market affected the development of the appropriations bill, with Congress adding funds during conference: "*Conferees agreed to shift funds to revitalize the Section 235 mortgage subsidy program in an effort to stimulate homebuying and shore up the lagging home building industry*" (CQ (1981)). The Annual Report of the Federal Reserve noted that total real residential construction expenditures dropped 13% for the year, but HUD programs were responsible

[142]The 'high-employment budget surplus,' the prevailing structural budget deficit measure, was estimated to have been reduced by $10 billion in CY1980, though federal expenditures were surging because of higher net interest costs, elevated unemployment, and cost-of-living adjustments for mandatory social insurance programs (Economic Report of the President 1981, p. 157).

for the resilience and increased construction of multifamily and condominium units (Annual Report of the Federal Reserve Board, p. 7).[143] We thus classify the policy change as cyclically motivated by concerns about the housing and credit markets, cyclical budget deficits, and broader inflationary dynamics.

Omnibus Budget Reconciliation Act of 1981 (Pub. L. 97-35)

Enacted: August 13, 1981

The Act revised upwards the previous increase in GNMA's Section 305(c) general Presidential special assistance purchase authority from $900 million effective October 1, 1980 (Pub. L. 96-339) to an increase of $1.1 billion on October 1, 1981, again subject to an appropriations act, but without fiscal year limitation. The Act also capped special assistance authority to enter commitments to purchase mortgages under Section 305 of the NHA to a total aggregate principal of $1.973 billion for FY1982, with the caveat that no more than $580 million could be commitments for projects without some units assisted under Section 8. Because the increase was subject to an appropriations bill, we do not consider it a binding, significant policy change affecting Ginnie's purchases. The bill reflected considerable negotiation and compromise between the Republican controlled Senate and Democratic House majority; presaging the approaching wind-down of Ginnie's special assistance functions, the House version of the bill additionally contained a provision that would have required GNMA to sell off at least $2 billion of its mortgage portfolio from the Section 305 special assistance programs in FY1982, but it was dropped in conference (House Budget Committee (1981), p. 703).[144]

[143]The Economic Report of the President suggested that federal housing policies for multifamily construction were propping up overall housing starts following the summer rebound: "*Multifamily starts—which increased from September to November—were bolstered somewhat by Federal subsidy programs*" (Economic Report of the President 1981, pp. 171–172).

[144]The conference report explained that: "*The House bill contained a provision to increase GNMA's*

Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1982 (Pub. L. 97-101)

Enacted: December 23, 1981

Policy Change:	Special Assistance Increase
Agency:	GNMA
Impact:	+$0.173 billion
News:	Dec. 1981
Effective:	Dec. 1981
Classification:	Cyclical

The Act set a special assistance loan limitation for funding commitment contracts and purchases under Section 305 of the Housing Act to a total aggregate principle of $1.973 billion for FY1982, in line with the OBRA of 1981 (see above). The 1982 budget had requested an increased loan limit of $3.6 billion, up from $1.8 billion, which was matched by the House bill but not by the Senate bill. The enacted loan limit represented an increase of $173 million in GNMA's commitment authority relative to current policy for the prior fiscal year (see above). The fiscal year had already started October 1, 1981, so this authorization was effective upon enactment. The Senate's preferred lower funding limitation was

mortgage purchase authority under the Special Assistance Functions by $1.1 billion on October 1, 1981. The Senate amendment contained a similar provision, except that it increased GNMA's authority by $2,300,000,000 on October 1, 1981, and provided that not more than $942,800,000 of that amount shall be available for the purchase of or commitments to purchase mortgages secured by projects which do not contain units assisted under sec. 8 of the US Housing Act of 1937. The conference report contains the House provision... The House bill also included a provision not contained in the Senate bill providing that (1) during fiscal year 1982, GNMA may not enter into commitments to purchase mortgages, with an aggregate principal amount in excess of $1,973,000,000; and (2) that such amount shall not include any authority to enter into commitment which was authorized for use during fiscal year 1981 but was not utilized during such year." The conference report contained the first House provision, amended with the enacted Section 8 limitation on commitments (House Budget Committee (1981), p. 703).

accepted as an amendment onto the conference bill, thus we date the news of the policy change being made public to the conference bill clearing both chambers on December 10, 1981.

The higher unmatched request for Ginnie's special assistance functions was intended "*to 'buy-out' the existing pipeline of project applications for insurance (FHA) which are being processed on the assumption that tandem financing would be available. Commitments issued in 1982 will be in support of section 8 and targeted tandem projects which were covered by applications for FHA mortgage insurance commitments submitted on or before February 13, 1981*" (House Committee on Appropriations (1981), p. 8). Signaling a final wind-down of the Tandem programs, the enacted level was intended to only cover "*applications that had the status of 'conditional in process' to 'firm commitment" for insurance purposes as of February 13, 1981*" (Senate Committee on Appropriations (1981), p. 15).

The appropriations Act also increased GNMA authorizations to make new commitments to issue guarantees to carry out the purposes of Section 306 of the NHA by $15.25 billion, up to $68.25 billion for FY1982. The 1982 budget had proposed credit control language limiting GNMA's commitments to guarantee MBS to $48 billion, which the House and Senate rejected based on the concern that it "*could have a **negative effect on the already depressed housing industry***" (Senate Committee on Appropriations (1981), p. 16). The bill was enacted in the midst of the recession lasting from July 1981 through November 1982, and the accompanying committee report language explicitly cited concerns about a depressed housing market. We thus classify the policy change as cyclically motivated.

Continuing Appropriations for FY1983 (Pub. L. 97-377)

Enacted: December 21, 1982

Policy Change:	Special Assistance Decrease
Agency:	GNMA
Impact:	-$1.473 billion
News:	Dec. 1982
Effective:	Dec. 1982
Classification:	Cyclical

The continuing appropriations bill set a special assistance loan limitation for GNMA commitment contracts and purchases under Section 305 of the NHA to a total aggregate principle of $500 million for FY1983, to be paid from collections received. Of this, $250 million was for the targeted tandem program, and the other $250 million was for Section 8 construction projects (House Committee on Appropriations (1982a), p. 189). The conference bill restored the $500 million increase initially proposed in the House bill, which had been struck in the Senate's version of the bill (House Committee on Appropriations (1982a), p. 189). The enacted loan limit represented a decrease of $1.473 billion in GNMA's commitment authority relative to current policy for the prior fiscal year (see above). The fiscal year had already started October 1, 1982, so this authorization was effective upon enactment. We determine that the news of Ginnie's decrease in special assistance authority was made public in December 1982, when the House, Senate, and conference versions of the bill all cleared both chambers.[145]

While the loan limitation amounted to decreased support for the housing and mortgage market relative to current policy, it nonetheless appears to have

[145]The FY1983 HUD-Independent Agencies bill previously reported by the House Appropriations Committee and partially incorporated into the continuing appropriations act had deliberately deferred action on GNMA's special assistance programs, rendering the conference bill the appropriate benchmark (House Committee on Appropriations (1982b), p. 4).

been intended as stimulative in the sense of delaying the administration's imminent repeal of the program (see below). The accompanying House report framed the special assistance programs as "***stimulating mortgage lending and building activities when credit conditions so warrant***" and stressed that the funds would have a positive impact on construction employment: "***these funds will create construction jobs in as short a time as possible****. The projects are ready, for the most part, to go to* ***construction in the next three to six months.*** *In this connection, the Committee directs the Department to allocate the $500,000,000 included herein within 30 days of enactment of this joint resolution. It is expected that this level of funding* ***will generate approximately 15,000 jobs***" (House Committee on Appropriations (1982b), p. 8). Beyond explicitly referencing near-term concerns about mortgage market activity and construction employment, the bill was also drafted and moved exceptionally quickly.[146] And the bill was enacted just as the economy was bottoming out from the recession lasting from July 1981 through November 1982. We thus classify the policy change as cyclically motivated.

Supplemental Appropriations Act of 1984 (Pub. L. 98-181)

Enacted: November 30, 1983

Policy Change:	Repeal of Tandem Programs
Agency:	GNMA
Impact:	-$2.92 billion
News:	Nov. 1983
Effective:	Nov. 1983
Classification:	Non-Cyclical

The Act repealed Sections 305 and 313 of the National Housing Act, which

[146]The House version of the bill passed December 14, the Senate version of the bill passed December 19, and both chambers agreed to the conference report on December 20.

had authorized GNMA's general special assistance functions and Brooke-Cranston Tandem program, respectively. Repeal was effective upon enactment, but previously entered commitments to purchase mortgages, as well as the servicing and disposition of related mortgage holdings, would continue to be governed by the provisions of such sections as in effect immediately before repeal.

Citing 'large losses' to the federal government associated with the programs, Reagan administration's FY1984 Budget request had proposed winding down both subsidized special assistance programs and repealing their statutory authorizations, as later implemented by the Act.[147] Under existing law, the budget projected that outlays for GNMA's purchase activity would total $1.43 billion in FY1984 and $212 million in FY1985, but the administration's proposed legislation would instead result in negative outlays of -$842 million in FY1984 and -$1.038 billion for FY1985 (The Budget for Fiscal Year 1984, p. 5-57). Annualizing, we estimate the elimination of the special assistance programs would reduce federal outlays by $875 million in the year starting November 1983.[148] By the design of the program, special assistance purchase volumes were considerably larger than their associated net budgetary outlays, which made up the difference between purchase and sales price. Based on the recent estimate that $150 million in net outlays supported $1 billion in special assistance purchases (see Pub. L. 95-392 above), we estimate that this reduction in outlays would reduce purchases by $5.83 billion (-$875 million $\times \frac{\$1000}{\$150}$= -$5.83 billion). Using the two-year rule, we assign an annualized decrease in GNMA's purchases of

[147]The budget request elaborated, citing budgetary concerns about the programs: "*For 1984, the administration proposes no further activity for the GNMA tandem mortgage subsidy programs. The statutory authority for these programs, which involves making direct loans at large losses to the Federal Government, is proposed for repeal. Contingent upon successful enactment of this proposal, outstanding Treasury borrowing for these programs will be forgiven, and the remaining fund balances transferred to the GNMA management and liquidating functions fund*" (The Budget for Fiscal Year 1984, p. 5-56).

[148]As the Act took effect after the first two months of FY1984, we assume assume a 5/6–1/6 split between projected FY1984 and FY1985 impacts ($(-842) \times \frac{10}{12} + (-1038) \times \frac{2}{12} = -875$).

$2.92 billion, relative to current policy. We determine that the news of GNMA's special assistance programs being repealed was made public in mid-November 1983, when the conference bill passed both chambers.[149]

The Reagan administration's efforts to pare back GNMA activity, particularly subsidized mortgage purchases, were part of a broader, widely recognized effort to shrink the government's active role in housing markets, and the GSEs in particular. The Reagan administration's FY1983 Budget request had proposed reducing GNMA's guarantee commitment level by $20 billion (The Budget for Fiscal Year 1983, p. 5-66), and requested no new authorization for the tandem programs, though it stopped short of proposing a full repeal of their authorization (see above). That budget had argued that reducing federal credit programs "*should relieve pressure on interest rates and lead to a sustainable and non-inflationary recovery of the mortgage finance and construction industries*" (The Budget for Fiscal Year 1983, p. 5-70). The administration had also cited budgetary concerns about the nature of the special assistance programs in proposing their statutory repeal. In October 1984, the President of the Mortgage Bankers Association had railed against the administration's 'ideological' effort to shrink the government, privatize, and deregulate: "*The Reagan administration's philosophy has shifted the allocation of federal government resources toward new priorities, intentionally or otherwise* ***diminishing the high social priority of housing in this country***" (The American Banker (10/18/1983)). Because the efforts to scale back Fannie and Freddie, and the more successful efforts to check Ginnie, were widely viewed as driven by political philosophy or long-term budgetary aims, we classify this policy as

[149]The appropriations process had badly broken down in FY1984, resulting in a slew of continuing resolutions and supplemental appropriations bills, and the enacted bill was a highly contentious final funding measure for the year. President Reagan had, however, already signed into law the Department of Housing and Urban Development; Independent Agencies Appropriation Act, 1984 (Pub. L. 98-45), enacted July 12, 1983, which both deliberately ignored GNMA's special assistance authorizations and did not include repeal of Sections 305 and 313.

unrelated to contemporaneous economic conditions.

Following the repeal of the general and emergency special assistance functions, Ginnie's role in mortgage markets was almost entirely confined to guaranteeing timely payment on pools of FHA/VA mortgages. Annual appropriations bills continued to set authorization limits for Ginnie entering commitments to guarantee MBS, and this statutory limitation was frequently changed in response to economic, budgetary, and social policy objectives. But because Ginnie guaranteed pools issued by third parties, this guarantee activity did not result in purchase or retained portfolio activity.

3.4.4 Federal Reserve

During the Great Recession and ensuing period of housing and financial market fragility, the Federal Reserve Board became the principal buyer of agency debt and a major holder of agency MBS. The Federal Reserve announced on November 25, 2008 that it would initiate a program to purchase obligations of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks, as well as MBS backed by Fannie Mae, Freddie Mac, and Ginnie Mae (or 'agency MBS'). As of June 28, 2017, the Federal Reserve Bank held $1.77 trillion worth of agency MBS and $8.1 billion worth of federal agency debt securities, comprising 39.4% of the Federal Reserve System's $4.51 trillion balance sheet (FRB H.4.1). The Fed's holdings of agency debt peaked at $170 billion in March 2010.

Though this was the Federal Reserve's first foray into purchasing mortgage securities, transacting in agency securities had been authorized since the 1960s,

and the Fed had previously purchased agency debt instruments. The Interest Rate Adjustment Act of 1966 (Pub. L. 89-597, enacted September 21, 1966), a bill regulating and attempting to reduce interest rates, had expanded the authority of the Federal Open Market Committee's open-market operations (OMOs) to include transacting in "*any obligation which is a direct obligation of, or fully guaranteed as to principal and interest by, any agency of the United States*." According to an accompanying Senate committee report, Congress's intent behind the provision was to "*broaden the scope of Federal Reserve open-market operations in regulating the supply of reserves available to the banking system*" (Senate Committee on Banking and Currency (1966), p. 2). The Act granted this expanded authority over OMO purchases for only one year, but Congress extended this authority in 1967 and permanently amended this change to Sec. 14(b)(2) of the Federal Reserve Act in 1968 (Haltom and Sharp (2014)). Pub. L. 90-505, enacted September 21, 1968, also expanded authority regarding agency security purchases to allow direct purchases from government agencies. Facing political pressure from Congress, the Federal Reserve, under Chairman Arthur Burns, first engaged in purchases of agency securities in 1971 (Haltom and Sharp (2014)). The Fed continued to purchase FNMA debt securities and that of other federally sponsored agencies through 1981, amassing as much as 10% of Fannie's debt outstanding by the mid-1970s, and the Fed still held FNMA debt on its balance sheet through 2000 (Haltom and Sharp (2014)). This expanded authority for OMO purchases proved highly consequential for the conduct of unconventional monetary policy during the Great Recession.

FOMC Announcement: QE1 Launch

Announced: November 25, 2008

Policy Change:	QE1 Launch
Agency:	GNMA
Impact:	+$1.39 billion
News:	Nov. 2008
Effective:	Dec. 2008
Classification:	Cyclical

The Federal Reserve announced on November 25, 2008 that it would initiate a program to purchase agency MBS and obligations of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks, shortly after FNMA and FHLMC had been taken into conservatorship by the FHFA and US Treasury Department (see listing under FNMA, Sec. 3.4.1). Concurrent with the September 2008 conservatorship announcement, the Treasury had also initiated its own agency MBS purchase program (see listing under Treasury, Sec. 3.4.5). Noting that "*[s]preads of rates on GSE debt and on GSE-guaranteed mortgages have widened appreciably of late*," the FOMC press release offered the following motivation: "*This action is being taken to* ***reduce the cost and increase the availability of credit for the purchase of houses, which in turn should support housing markets and foster improved conditions in financial markets*** *more generally*" (Federal Reserve Press Release November 25, 2008). The Board of Governors initially authorized purchases of $100 billion worth of GSE debt obligations and up to $500 billion worth of agency MBS. The full schedule of purchases was not announced, but purchases were "*expected to take place over several quarters*," starting the following week, in early December. Given the uncertain duration and pace of purchases, we use the two-year rule and assign an annualized increase in the Federal Reserve's agency MBS purchases of $250 billion, with news of the policy change being made public in November 2008. The policy announcement significantly affected

intraday trading volumes and yields on long-term bonds (Krishnamurthy and Vissing-Jørgensen (2011)).

This announcement marked the beginning of the first round of quantitative easing, or QE1, which would run from December 2008 to March 2010. The action was taken in the midst of the Great Recession, explicitly in response to a severe credit crunch, housing market collapse, and declining economic activity, and is thus classified as cyclically motivated.

FOMC Announcement: QE1 Expansion

Announced: March 18, 2009

Policy Change:	QE1 Expansion
Agency:	Federal Reserve
Impact:	+$750.0 billion
News:	Mar. 2009
Effective:	Mar. 2009
Classification:	Cyclical

The Federal Reserve announced on March 18, 2009 that it would expand its purchases of agency MBS by $750 billion, and double its purchases of agency debt from $100 billion to up to $200 billion. The FOMC noted that the expanded MBS purchases would bring "*total purchases of these securities to up to $1.25 trillion* ***this year***" (FOMC Statement March 18, 2009). The motivation for the expansion of the agency MBS program was "*[t]o provide greater support to mortgage lending and housing markets*." The FOMC also announced it would purchase up to $300 billion worth of long-term Treasury securities within the next six months to "*help improve conditions in private credit markets*" (FOMC Statement March 18, 2009). The policy announcement again significantly affected intraday trading

volumes and yields on long-term bonds (Krishnamurthy and Vissing-Jørgensen (2011)). Given the explicit projection that the MBS purchase program would be completed within the year, we do not invoke the two-year rule and instead assign an annualized increase in the Federal Reserve's MBS purchases of the full $750 billion announced in March 2009.

The FOMC statement noted that the economy was still contracting, and that "*[j]ob losses, declining equity and housing wealth, and tight credit conditions have weighed on consumer sentiment and spending*." The action was taken in the midst of the Great Recession, explicitly in response to a severe credit crunch, housing market collapse, and declining economic activity, and is thus classified as cyclically motivated.

FOMC Statement: Reduction of Agency MBS Program

Announced: November 4, 2009

The FOMC announced that it was slowing the pace of both its agency debt and MBS purchases, and that the expected volume of agency debt purchased would be $175 billion, down $25 billion from the previously announced target. The FOMC offered the following explanation: "*The amount of agency debt purchases, while somewhat less than the previously announced maximum of $200 billion, is consistent with the recent path of purchases and reflects the limited availability of agency debt*" (FOMC Statement November 4, 2009). The deceleration in purchases was intended "*to promote a smooth transition in markets*" and purchases were projected to be completed by the end of 2010Q1. The overall intent of both asset purchase programs was "*[t]o provide support to mortgage lending and housing markets and to improve overall conditions in private credit markets*" (FOMC Statement November 4, 2009). Because the policy announcement did not affect

the targeted volume of MBS purchases and only modestly extended the timing of purchases, we do not consider this a significant policy change for the Fed's MBS purchase program.

FOMC Statement: Conclusion of Agency MBS Program

Announced: December 16, 2009

The FOMC again announced that it was slowing the pace of its agency debt and MBS purchases, and expected total purchases of $175 billion and $1.25 trillion respectively, and reiterated that the program was expected to be complete by projected to be completed by the end of 2010Q1. And the statement again reaffirmed the following motivation for the purchase program: "*To provide support to mortgage lending and housing markets and to improve overall conditions in private credit markets*" (FOMC Statement December 16, 2009).

In total, the Federal Reserve purchased $432.3 billion worth of FHLMC MBS, $703.6 billion worth of FNMA MBS, and $114.0 billion worth of GNMA MBS, exhausting the entire $1.25 trillion MBS purchase commitment. And the Federal Reserve purchased $67.1 billion worth of FHLMC debt, $67.4 billion worth of FNMA debt, and $37.7 billion worth of FHLBank debt, leaving $2.9 billion of the revised $175 billion purchase commitment unused.

FOMC Statement: Reinvestment of Agency MBS Program

Announced: August 10, 2010

The FOMC announced that it would maintain the present volume of the Federal Reserve's portfolio of securities held outright by reinvesting principal payments from its holdings of agency debt and MBS into longer-term Treasury securities, while continuing to rolling over the Federal Reserve's holdings of

Treasury securities as they matured. The intent behind maintaining the size of its securities balance sheet was "*[t]o help support the economic recovery in a context of price stability*" (FOMC Statement August 10, 2010).

FOMC Statement: QE2 Launch

Announced: November 3, 2010

The FOMC announced that it would purchase an additional $600 billion worth of longer-term Treasury securities at a pace of roughly $75 billion per month, to be concluded by the end of the second quarter of 2011. This announcement marked the beginning of the second round of quantitative easing, or QE2, which would run from November 2010 to June 2011. This round of Treasury purchases was intended "*[t]o promote a stronger pace of economic recovery and to help ensure that inflation, over time, is at levels consistent with its mandate*" (FOMC Statement November 3, 2010).

FOMC Announcement: Reinvestment of Agency MBS Program

Announced: September 21, 2011

Policy Change:	Agency MBS Reinvestment
Agency:	Federal Reserve
Impact:	+$262.0 billion
News:	Sep. 2011
Effective:	Sep. 2011
Classification:	Cyclical

On September 21, 2011, the FOMC announced that the principal payments from its holdings of agency debt and MBS would be reinvested into agency MBS, instead of Treasury securities. The motivation behind the change was

"*[t]o help support conditions in mortgage markets*" (FOMC Statement September 21, 2011). The FOMC maintained its policy of rolling over maturing Treasury securities. The statement made clear that that housing market remained a far cry from health: "*Investment in nonresidential structures is still weak, and the housing sector remains depressed.*" And the FOMC cited "*significant downside risks to the economic outlook, including strains in global financial markets*." The Federal Reserve also announced a maturity extension program in which it would purchase $400 billion worth of longer-dated Treasury securities with maturities between 6- and 30-years and sell an equal volume of Treasuries with maturities of under 3 years (popularly coined 'Operation Twist').

Market analysts at Morgan Stanley estimated that paydowns on the Fed's standing MBS portfolio could total $262 billion over the next twelve months, which was widely cited as an estimate of the Fed's expected increased demand for agency MBS as a result of the reinvestment program (Dow Jones Newswires (9/21/2011)). Financial newswires also underscored that the Fed's MBS reinvestment program had come as a surprise. *Dow Jones Newswires* explained that "*[t]he Fed decision to bolster the mortgage market surprised many traders and analysts who had been expecting the central bank would keep investing cash rolling off its existing portfolio into the Treasury market*" (Dow Jones News Service (9/21/2011)). Based on Morgan Stanley's projections, we score this policy as increasing the Fed's mortgage securities purchases by an annualized $262 billion starting in September 2011. Given the FOMC's stated concerns and objectives, we classify the agency MBS reinvestment program as cyclically and financially motivated.

FOMC Announcement: QE3 Launch

Announced: September 13, 2012

Policy Change:	QE3 Launch
Agency:	Federal Reserve
Impact:	+$480.0 billion
News:	Sep. 2012
Effective:	Sep. 2012
Classification:	Cyclical

On September 13, 2012, the FOMC announced that the Federal Reserve would purchase additional agency MBS at a pace of roughly $40 billion per month. No expected duration or target total volume of purchases was announced for this round of asset purchases. The FOMC also announced that it would continue Operation Twist, and estimated that the two purchase programs would collectively amount to increasing the Federal Reserve's holdings of long-dated securities by roughly $85 billion per month. The stated objective was "*[t]o support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate*," while noting that inflation was expected to remain below target over the medium term (FOMC Statement September 13, 2012). The statement also noted that the "*housing sector has shown some further signs of improvement, albeit from a depressed level.*"

This announcement marked the beginning of the third round of quantitative easing, or QE3, which would run from September 2012 through October 2014. According to a *Reuters* poll, around 60% of financial economists and market analysts had been expecting the Fed to launch a third round of quantitative easing at this FOMC meeting, but the consensus had been that the Fed would announce a mix of Treasury bond and agency debt purchases, as opposed to increasing its MBS acquisitions (Business and Finance Daily News Service (9/13/2012)).

Lending further support to having surprised markets, the policy announcement significantly affected yields on long-term bonds in intraday trading (Krishnamurthy and Vissing-Jørgensen (2011)). In light of the uncertain duration of QE3, we assume purchases would continue for at least one year, and score this policy as increasing the Fed's mortgage purchases by an annualized $480 billion for the year starting September 2012 ($40 $\times$ 12 = $480). Given the FOMC's stated concerns and objectives, we classify the launch of QE3 as cyclically and financially motivated.

FOMC Statement: QE3 Expansion Announced: December 12, 2012

On December 12, 2012, the FOMC announced that the Federal Reserve would continue to purchase additional agency MBS at a pace of roughly $40 billion per month, and would begin net purchases of longer-dated Treasuries at a pace of $45 billion per month when Operation Twist was concluded at the end of December 2012. The FOMC explained that "*these actions should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative*" (FOMC Statement December 12, 2012), and again cited concerns about downside risks from global financial markets.

FOMC Announcement: QE3 Taper

Announced: December 18, 2013

Policy Change:	QE3 Taper h
Agency:	Federal Reserve
Impact:	-$60.0 billion
News:	Dec. 2013
Effective:	Jan. 2014
Classification:	Cyclical

On December 18, 2013, the FOMC announced that it would slightly reduce the pace of its agency MBS purchases from $40 billion to $35 billion per month and its purchases of Treasuries from $45 billion to $40 billion per month, starting in January 2014. The FOMC reaffirmed its policy of reinvesting the principal payments from its holdings of agency debt and MBS into more agency MBS and rolling over Treasuries. The deceleration of purchases was made in "*light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions*" (FOMC Statement December 18, 2013). The statement also noted that "*the recovery in the housing sector slowed somewhat in recent months*" and that "*[f]iscal policy is restraining economic growth*" (FOMC Statement December 18, 2013).

While talk of whether the Fed would 'taper' its bond buying program was rampant, *Market Watch* reported that only one out of four economists surveyed by the *Wall Street Journal* the Friday before the announcement had "*predicted the Fed will scale back its bond buying at its December meeting*" (MarketWatch (12/18/2013)). We do not consider the Fed's $5 billion monthly reduction of MBS purchases to have been well anticipated by financial markets, and view news of the policy change as having been made public in December. In light of the uncertain duration of QE3, we assume the reduced pace of purchases would

continue for at least one year, and score this policy as reducing the Fed's mortgage purchases by an annualized $60 billion (($35 - $40) × 12 = -$60). Given the FOMC's stated concerns and objectives, we classify the tapering of QE3 as also cyclically motivated.

FOMC Statement: QE3 Termination Announced: October 29, 2014

On October 29, 2014, the FOMC announced that it would end its current program of purchasing agency MBS and Treasury securities at the end of October 2014, citing "*a substantial improvement in the outlook for the labor market since the inception of its current asset purchase program*" (FOMC Statement October 29, 2014). The FOMC again reaffirmed its policy of rolling over Treasuries and reinvesting the principal payments from its holdings of agency debt and MBS into more agency MBS. The announcement of the complete termination of QE3 had been widely expected and largely priced in. The *Financial Times* reported that "*The US central bank is widely forecast to announce the end of its third round of quantitative easing*" just ahead of the FOMC announcement (Financial Times (10/29/2014)). We thus consider the termination of the Fed's MBS purchases under QE3 as a significant but long-anticipated policy change.

Between October 2011 and September 2015, the Federal Reserve's reinvestment of principal payments from holdings of agency debt and MBS and additional agency MBS purchases totaled $572.3 billion worth of FHLMC MBS, $1.015 trillion worth of FNMA MBS, and $451.1 billion worth of GNMA MBS, collectively totaling $2.039 trillion.

3.4.5 US Treasury Department

The Housing and Economic Recovery Act of 2008 temporarily authorized the US Treasury Department to purchase securities issued by Fannie and Freddie and authorized the newly created Federal Housing Finance Agency to take the Enterprises into conservatorship, if deemed necessary. In September 2008, Fannie and Freddie were placed under the conservatorship of the Treasury and FHFA, and were ordered to first increase, then gradually reduce their mortgage portfolios. The Treasury concurrently announced an agency MBS purchase program that resulted in nearly $200 billion worth of purchases through the end of 2009. During conservatorship, Treasury provided the Enterprises with funds to ensure positive net worth in exchange for equal amounts of senior preferred stock, in accordance with periodically amended Senior Preferred Stock Purchase Agreements. Treasury unexpectedly announced it would begin unwinding its agency MBS purchase program in March 2011. Fannie and Freddie have never made use of their $2.25 billion standby credit lines with the Treasury Department.

Treasury Agency MBS Purchase Program

Announced: September 7, 2008

Policy Change:	MBS Purchase Program Launch
Agency:	Treasury
Impact:	+$80.0 billion
News:	Sep. 2008
Effective:	Sep. 2008
Classification:	Cyclical

The Housing and Economic Recovery Act of 2008 (Pub. L. 110-289, enacted July 30, 2008) amended the FNMA Charter Act, FHLMC Act, and Federal Home Loan Bank Act to temporarily authorize the US Treasury to purchase any volume of FNMA, FHLMC, or FHLBank obligations or securities authorized under their respective charters, conditional on the Secretary making an emergency determination that such purchases were necessary to "*(i) provide stability to the financial markets; (ii) prevent disruptions in the availability of mortgage finance; and (iii) protect the taxpayer*" (Sec. 1117). The Secretary of the Treasury was authorized to use the proceeds of the sale of any securities to finance such purchases. This emergency authority was scheduled to expire on December 31, 2009.

Concurrent with the FHFA and Treasury Department taking FNMA and FHLMC into government conservatorship on September 7, 2008, the Treasury announced a GSE MBS Purchase Program to begin later that month. Treasury's stated objective behind the program was "*to broaden access to mortgage funding for current and prospective homeowners as well as to* ***promote market stability***" (Department of the Treasury (2008b)). The announcement did not contain specific amounts of the planned purchases, but stated that the scale of the program would be based on developments in capital markets and the housing market. The Fed's September 10, 2008 Greenbook stated that Treasury's expected outlays for purchasing equity and MBS of Fannie and Freddie were highly uncertain, but estimated outlays of $20 billion in calendar 2008 and $60 billion in 2009 (September 10, 2008 Greenbook, p. I-6). Accordingly we assign an $80 billion expected annualized volume of agency MBS purchases under Treasury's program for the year starting September 2008. While perceived odds of a federal rescue of the GSEs had been rising in the summer of 2008, the move to take the Enterprises into conservatorship—and its accompanying agency MBS purchase

program—clearly surprised markets and were unequivocally cyclically motivated (see listing under FNMA, Sec. 3.4.1). In practice, Treasury accumulated a portfolio of agency MBS of $192 billion between September 2008 and December 2009.

Under another HERA authorization, the Treasury, in conjunction with FHFA, HUD, Fannie, and Freddie also created an initiative in October 2009 to provide support to state and local Housing Financing Agencies (HFAs). This initiative was designed to support low mortgage rates and expand resources for low- and middle-income borrowers to purchase or rent homes, making them more affordable over the long-term. In December 2009, two Treasury supported credit programs, the Temporary Credit and Liquidity Program and the New Issue Bond Program, were launched as part of the countercyclical HFA initiative.[150]

Emergency Economic Stabilization Act of 2008 (Pub. L. 110-343)

Enacted: October 3, 2008

On September 20, 2008, the Treasury Secretary introduced a proposal to purchase mortgage-related assets up to a limit of $700 billion outstanding at any time. This proposal had the support of the President, and negotiations with leaders in Congress commenced to draft appropriate legislation. A first vote on the bill failed on September 28, sparking the largest stock market losses during trading on September 29 since Back Monday in 1987.

Congress quickly reversed course, and the Emergency Economic Stabiliza-

[150]Treasury purchased a participation interest in the Temporary Credit and Liquidity Program, which was a liquidity facility for outstanding HFA bonds administered by Fannie and Freddie. Under the New Issue Bond Program program, Treasury purchased GSE securities backed by housing bonds issued by HFAs.

tion Act of 2008 was enacted on October 3, 2008. The Act created the Office of Financial Stability within the Treasury Department, which was to administer a $700 billion Troubled Asset Relief Program (TARP). The legislation's statutory definition of 'troubled assets' eligible for purchase by the Treasury included residential or commercial mortgages and any securities, obligations, or other mortgage-related instruments originated or issued before March 15, 2008. The legislation limited the Secretary's authority to purchase troubled assets to: (1) $250 billion outstanding at any one time; (2) $350 billion outstanding at any one time if, at any time, the President certified to Congress that the Secretary needed to exercise authority for up to such an amount; and (3) $700 billion outstanding at any one time if, at any time after such a certification, the President reported to Congress a plan of the Secretary to exercise the authority authority for up to such an amount, unless Congress enacted a joint resolution of disapproval within 15 calendar days of the plan's transmission. The total authorization of $700 billion in October 2008 was later reduced to $475 billion by the Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub. L. 111-203, enacted July 21, 2010).

Contrary to its name, TARP funds were primarily used for a Capital Purchase Program, in which Treasury injected $250 billion in capital into a wide range of banks and recently rechartered bank holding companies (Department of the Treasury (2008c), p. 6). The Capital Purchase Program was announced on October 14, 2008. TARP funds were also later used for a federally incentivized mortgage refinancing program (see 'Homeowner Affordability and Stability Plan' under FNMA, Sec. 3.4.1).

The Initial Report to Congress of the Office of the Special Inspector General

for the TARP explained that the program authorization could have been spent on MBS originated or issued by March 14, 2008. That report also characterized the Capital Purchase Program as a departure from the legislation's 'original intent': "*According to the Interim Assistant Secretary for Financial Stability, 'Purchasing equity in healthy banks around the country would be a faster and more direct way to inject much-needed capital into the system and restore confidence compared with asset purchases.' Treasury decided that healthy banks would be in the best position to increase the flow of credit in their communities. The decision to provide a direct infusion of capital into banks was widely seen as a shift in approach from the original understanding of purchasing troubled assets, which would have presumably involved the purchase of troubled mortgages or mortgage-backed securities. The former Treasury Secretary explained: 'Given the severity and magnitude of the situation, an asset purchase program would not be effective enough, quickly enough. Therefore we exercised the authority granted by Congress in this legislation to develop and quickly deploy a $250 billion capital-injection program, fully anticipating we would follow that with a program for troubled asset purchases'*" (SIGTARP (2009), p. 49).[151] The follow through never materialized, and TARP funds were not used for large scale purchases of troubled assets.

Wessel (2009) suggested that Federal Reserve Chairman Bernanke and some of Treasury Secretary Paulson's staff strongly favored capital injections over troubled asset purchases, and Paulson had reportedly concluded that funds would have to be used for bank capitalizations the morning after the first failed TARP vote because "*buying toxic assets was going to take too long*" (Wessel (2009), pp. 227, 236). Paulson abruptly killed the idea of any troubled asset purchases in a December 11, 2008 press conference, announcing off-the-cuff that doing so

[151]For an overview of the Capital Purchase Program authorization and background, see SIGTARP (2009), pp. 29–35.

"*was no longer 'the most effective way' to use the money... Instead, he said, the Treasury Department planed to use nearly all the money to shore up the capital foundation of the nation's banks and to try to get consumer lending going again*" (Wessel (2009), p. 243). Consequently, we do not consider TARP to be a significant policy change affecting the Treasury Department's holding of mortgage securities, counter to its name and original intent. Authority to make new investments under the TARP program expired on October 3, 2010.

Treasury Agency MBS Purchase Program Sales

Announced: March 21, 2011

Policy Change:	MBS Purchase Program Sales
Agency:	Treasury
Impact:	-$120.0 billion
News:	Mar. 2011
Effective:	Mar. 2011
Classification:	Cyclical

On March 21, 2011, the Treasury announced it would start selling up to $10 billion in agency MBS per month, subject to market conditions. It was also announced that sales would begin that month. Given the outstanding MBS balance of $142 billion, Treasury cited that at this pace, "*the portfolio would be unwound in whole* ***over approximately one year***" between sales and continued paydowns of $2 billion to $4 billion a month (Department of the Treasury (2011a), p. 1). Prior to March 2011, the Department's stated intent was to hold its MBS securities to maturity (Department of the Treasury (2011b), p. 104). A Treasury official also announced that the MBS purchase program was expected to yield a profit of $15 billion to $20 billion for taxpayers (Dow Jones Newswires

(3/21/2011a)).

We score the policy to change to active portfolio disposal as reducing the Treasury's MBS net purchases by an annualized $120 billion in the year starting March 2011 ($10 × 12 = $120). The Treasury Department's announcement appeared to take market analysts by surprise, and Treasury yields fell in intraday trading. The head of RBC Capital Markets' government bond trading desk claimed that "*[t]he market was not prepared for this*" (Dow Jones Newswires (3/21/2011a)). The timing of the sale may also have been motivated by public debt outstanding approaching statutory debt ceiling limit; a Treasury official stated that the sale might delay hitting the debt ceiling, expected to be reached between April 15 and May 31, by several days (Dow Jones Business News (3/21/2011b)).[152]

An accompanying Treasury Press Center FAQ addressed the motivation head-on: "*Selling MBS is consistent with the general pattern of Treasury divestment of financial assets acquired during 2008 and 2009 as part of the various financial stabilization programs. Aided by such programs, today, the* ***market for agency-guaranteed MBS has notably improved along with broader financial conditions since Treasury acquired the portfolio****. Additionally, Treasury's mission does not typically include managing a large mortgage portfolio*" (Department of the Treasury (2011a), p. 1). Given that the Treasury's sale was motivated by a reversal in cyclical economic conditions, we classify the MBS portfolio liquidation as principally cyclically motivated, although budgetary concerns were likely also a factor.

The Treasury FAQ also emphasized that the MBS sales would have no im-

[152]While raising the debt ceiling was typically a politicized but pro forma matter, the Republican majority in the House of Representatives was demanding spending cuts in exchange for an increase, and after a protracted showdown the ceiling was eventually increased by the Budget Control Act of 2011 (Pub. L. 112-25, enacted August 2, 2011), a spending reduction measure.

pact on the scheduled wind down of the GSEs' retained portfolios: "*The Enterprises are currently in the process of gradually reducing the size of their retained portfolios at a pace of no less than 10 percent per year, as they agreed to do in the preferred stock purchase agreements between the Treasury and the Enterprises. Both Enterprises are on track to meet or exceed the scheduled reductions, and the Administration does not anticipate any changes to this policy*" (Department of the Treasury (2011a), pp. 2–3).

The Enterprises remain in the conservatorship of the Treasury and FHFA, nearly nine years after their federal rescue. No substantial GSE reform has been enacted since the conservatorship agreements were entered.

3.5 Results

Table 3.4 compiles the significant, binding policy events resulting from the narrative analysis. Each intervention is characterized by a brief description of the policy change, the agency affected, its annualized projected impact on mortgage purchase activity (in nominal billions of US dollars), our determination of when its news was made public, the timing of the policy taking effect, and our classification of the policy's motivation as either cyclical or non-cyclical. We document a total of 55 distinct significant policy changes over 1968–2014.[153] After aggregating to a monthly frequency, there are 48 months in which the news of an intervention is made public; there are 22 months with policy interventions classified as non-cyclically motivated and 28 months with those classified

[153]There are a total of 69 policy entries by each agency in Table 3.4, but one distinct policy change often applied to both Fannie and Freddie, albeit sometimes with different portfolio implications for each Enterprise.

as cyclically motivated. News of both cyclically motivated and non-cyclically motivated policies are attributed to December 1982 and February 2008. In the sample that excludes the 2007/08 financial crisis by omitting policy interventions after December 2006, there are 20 months with non-cyclically motivated policy events and 15 months with those classified as cyclically motivated.

Mixing policy changes taking effect relatively quickly with those facing long implementation delays can be difficult to handle in certain econometric applications, particularly in the context of news shocks with further lags between mortgage commitments and purchases. For this reason, Fieldhouse, Mertens, and Ravn (2017) further exclude all regulatory instruments from this narrative analysis scheduled to take effect more than nine months after their news was made public. This additional sample restriction involves dropping three distinct policy events listed in Table 3.4: the increase in GNMA's special assistance authority from the Housing and Urban Development Act of 1968, announced in August 1968 but not taking effect until July 1969; the affordable housing goals set for both Fannie and Freddie in 1992, agreed upon in July 1991 but not taking effect until January 1993; and the affordable housing goals set for both Fannie and Freddie in 2000, announced in July 1999 but not taking effect until January 2001. These exclusions reduce the number of months with non-cyclically motivated interventions to 19 in the full sample, while there remain 28 months with cyclically motivated policy interventions. Similarly, there are 17 months with non-cyclically motivated interventions and 15 months with those cyclically motivated in the sample that excludes the 2007/08 financial crisis by omitting interventions after December 2006. As a result of these exclusions to the narrative instrument, Table 2 in Fieldhouse, Mertens, and Ravn (2017) is slightly different than Table 3.4 below.

Table 3.4: Narrative Measures of Policy Changes

Policy Description	Agency	Impact	News	Classification
HUDA 1968: Special Assistance	GNMA	+$0.25 billion	Aug. 1968	Non-Cyclical
HUDA 1968: Increased Debt-to-Capital Ratio	FNMA	+$1.39 billion	Oct. 1968	Non-Cyclical
Increased Debt-to-Capital Ratio	FNMA	+$1.13 billion	Dec. 1969	Cyclical
HUDA 1969: Special Assistance	GNMA	+$0.75 billion	Dec. 1969	Cyclical
Treasury-Guaranteed Capitalization	FNMA	+$2.6 billion	Apr. 1970	Cyclical
EHFA 1970: Special Assistance	GNMA	+$0.38 billion	July 1970	Cyclical
Conforming Mortgage Program Approval	FNMA	+$0.4 billion	Nov. 1971	Non-Cyclical
FHA/VA Tandem Authorization	GNMA	+$1.5 billion	Sep. 1973	Cyclical
FHA/VA Tandem Authorization	GNMA	+$3.3 billion	Jan. 1974	Cyclical
Subsidized Mortgage Purchase Program	FHLMC	+$1.5 billion	May 1974	Cyclical
FHA/VA Tandem Authorization	GNMA	+$1.65 billion	May 1974	Cyclical
HCDA 1974: Conforming Loan Limit	FNMA	+$1.14 billion	Aug. 1974	Non-Cyclical
HCDA 1974: Conforming Loan Limit	FHLMC	+$0.46 billion	Aug. 1974	Non-Cyclical
EHPA 1974: Tandem Program	GNMA	+$3.88 billion	Oct. 1974	Cyclical
FY1976 Approps: Tandem Program	GNMA	+$2.5 billion	Oct. 1975	Cyclical
HCDA 1977: Conforming Loan Limit	FNMA	+$4.82 billion	Oct. 1977	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FHLMC	+$0.21 billion	Oct. 1977	Non-Cyclical
HCDA 1977: Tandem Program Expansion	GNMA	+$3.75 billion	Oct. 1977	Non-Cyclical
FY1979 Approps: Special Assistance	GNMA	+$1.0 billion	Sep. 1978	Non-Cyclical
HCDA 1978: Mortgagee Expansion	FHLMC	+$2.0 billion	Oct. 1978	Non-Cyclical

Policy Description	Agency	Impact	News	Classification
FY1980 Approps: Special Assistance	GNMA	+$1.0 billion	July 1979	Non-Cyclical
HCDA 1979: Conforming Loan Limit	FHLMC	+0.86 billion	Dec. 1979	Cyclical
FY1981 Approps: Special Assistance	GNMA	-$0.2 billion	Sep. 1980	Cyclical
ARM Program Approval	FHLMC	+$0.37 billion	May 1981	Cyclical
ARM Program Approval	FNMA	+$0.4 billion	June 1981	Cyclical
Second Mortgage Program Approval	FNMA	+$5.0 billion	Sep. 1981	Cyclical
FY1982 Approps: Special Assistance	GNMA	+$0.17 billion	Dec. 1981	Cyclical
Increased Debt-to-Capital Ratio	FNMA	+$6.25 billion	Dec. 1982	Non-Cyclical
FY1983 Approps: Special Assistance	GNMA	-$1.47 billion	Dec. 1982	Cyclical
FY1984 Supp. Approps: Tandem Repeal	GNMA	-$2.92 billion	Nov. 1983	Non-Cyclical
Second Mortgage Program Approval	FHLMC	+$1.0 billion	Jan. 1986	Non-Cyclical
Decreased Debt-to-Capital Ratio	FNMA	-$2.7 billion	Apr. 1987	Non-Cyclical
Public Listing: Stock Split Capitalization	FHLMC	+$1.62 billion	Nov. 1988	Non-Cyclical
FHEFSSA 1992: Capital Requirements	FNMA	-$4.25 billion	Mar. 1990	Non-Cyclical
Affordable Housing Goals of 1992	FNMA	+$1.0 billion	July 1991	Non-Cyclical
Affordable Housing Goals of 1992	FHLMC	+$0.75 billion	July 1991	Non-Cyclical
Affordable Housing Goals of 1995	FHLMC	+$0.61 billion	Dec. 1995	Non-Cyclical
Affordable Housing Goals of 2000	FNMA	+$24.4 billion	July 1999	Non-Cyclical
Affordable Housing Goals of 2000	FHLMC	+$24.4 billion	July 1999	Non-Cyclical
Affordable Housing Goals of 2004	FNMA	+$7.6 billion	Apr. 2004	Non-Cyclical
Affordable Housing Goals of 2004	FHLMC	+$7.6 billion	Apr. 2004	Non-Cyclical
Accounting Scandal: Capital Surcharge	FNMA	-$141.4 billion	Sep. 2004	Non-Cyclical

Policy Description	Agency	Impact	News	Classification
Portfolio Growth Limit Imposed	FHLMC	-$42.8 billion	June 2006	Non-Cyclical
Portfolio Limit Increase	FNMA	+$17.15 billion	Sep. 2007	Cyclical
Portfolio Limit Increase	FHLMC	+$2.14 billion	Sep. 2007	Cyclical
ESA 2008: Jumbo Loan Limit	FNMA	+$41.57 billion	Feb. 2008	Cyclical
ESA 2008: Jumbo Loan Limit	FHLMC	+$41.57 billion	Feb. 2008	Cyclical
Removal of Portfolio Limit	FNMA	+$9.28 billion	Feb. 2008	Non-Cyclical
Removal of Portfolio Limit	FHLMC	+$9.05 billion	Feb. 2008	Non-Cyclical
Reduced Capital Surcharge	FNMA	+$53.33 billion	Mar. 2008	Cyclical
Reduced Capital Surcharge	FHLMC	+$43.33 billion	Mar. 2008	Cyclical
Reduced Capital Surcharge	FNMA	+$17.75 billion	May 2008	Cyclical
HERA 2008: Jumbo Loan Limit	FNMA	-$13.34 billion	July 2008	Cyclical
HERA 2008: Jumbo Loan Limit	FHLMC	-$13.34 billion	July 2008	Cyclical
Conservatorship: Portfolio Limit Increase	FNMA	+$67.5 billion	Sep. 2008	Cyclical
Conservatorship: Portfolio Limit Increase	FHLMC	+$66.75 billion	Sep. 2008	Cyclical
MBS Purchase Program Launch	Treasury	+$80.0 billion	Sep. 2008	Cyclical
QE1 Launch	Fed	+$250.0 billion	Nov. 2008	Cyclical
ARRA 2009: Jumbo Loan Limit	FNMA	+$13.34 billion	Feb. 2009	Cyclical
ARRA 2009: Jumbo Loan Limit	FHLMC	+$13.34 billion	Feb. 2009	Cyclical
HASP: Portfolio Limit Increase	FNMA	+$50.0 billion	Feb. 2009	Cyclical
HASP: Portfolio Limit Increase	FHLMC	+$50.0 billion	Feb. 2009	Cyclical
QE1 Expansion	Fed	+$750.0 billion	Mar. 2009	Cyclical
MBS Purchase Program Sales	Treasury	-$120.0 billion	Mar. 2011	Cyclical
Agency MBS Reinvestment	Fed	+$262.0 billion	Sep. 2011	Cyclical

Policy Description	Agency	Impact	News	Classification
Third SPSPA Amendment	FNMA	-$22.16 billion	Aug. 2012	Non-Cyclical
Third SPSPA Amendment	FHLMC	-$22.16 billion	Aug. 2012	Non-Cyclical
QE3 Launch	Fed	+$480.0 billion	Sep. 2012	Cyclical
QE3 Taper	Fed	-$60.0 billion	Dec. 2013	Cyclical

Notes: Acronyms (in chronological appearance): Housing and Urban Development Act (HUDA); Emergency Home Finance Act (EHFA); Housing and Community Development Act (HCDA); Emergency Home Purchase Act (EHPA); fiscal year (FY); adjustable-rate mortgage (ARM); Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA); Economic Stimulus Act (ESA); Mortgage-backed securities (MBS); Housing and Economic Recovery Act (HERA); quantitative easing (QE); American Recovery and Reinvestment Act (ARRA); Home Affordability and Stability Plan (HASP); and Senior Preferred Stock Purchase Agreements (SPSPA).

BIBLIOGRAPHY

Adler, Joe, 2009, "Obama Boosts Housing Initiatives", American Banker, October 30. Source: LexisNexis Academic.

The American Banker, 1980, "FHLMC Sending Out Uniform Documents On Adjustable Rate Mtges. to Lenders", November 21. Source: LexisNexis Academic.

The American Banker, 1980, "FNMA, FHLMC Hike Loan Limits", December 29. Source: LexisNexis Academic.

The American Banker, 1981, "FHLMC Plans Guarantee Program For Conventional Mortgage Loans", May 7. Source: LexisNexis Academic.

The American Banker, 1990, "HUD to Watch Fannie, Freddie More Closely", March 16. Source: LexisNexis Academic.

The American Banker, 2002, "In Brief: OFHEO to Study GSE Disclosure", April 9. Source: LexisNexis Academic.

Andrew, Suzanna M., 1981, "FNMA Unveils Adjustable Rate Mortgage Plan; Will Buy Eight Types, Four With Negative Amortization", The American Banker, June 26. Source: LexisNexis Academic.

Bajaj, Vikas, 2008, "Regulators, Trying to Help Housing, Ease Buying Limits on Loan Giants", The New York Times, February 28. Source: Factiva.

Bartke, Richard W., 1971, "Fannie Mae and the Secondary Mortgage Market", Northwestern University Law Review 66(1): 1–78.

Bartke, Richard W., 1972, "Home Financing at the Crossroads: A Study of the Federal Home Loan Mortgage Corporation", Indiana Law Journal 48(1): 1–42.

Berenson, Alex, 2003, "Three Top Executives at Freddie Mac Are Out", The New York Times, June 9.

Berry, Kate and Marc Hochstein, 2012, "Treasury Takes Steps to Speed Wind Down of Fannie and Freddie", American Banker, August 20. Source: Lexis-Nexis Academic.

Blackwell, Rob, 2004, "OFHEO to Offer Early Look at Fannie Findings", American Banker, September 21. Source: LexisNexis Academic.

Blackwell, Rob, 2004, "HUD Eases Affordable Housing Goals (Somewhat)", American Banker, November 2. Source: Business Insights: Essentials.

Blackwell, Rob, 2004, "Fannie Mae Says Earnings Restatement Could Produce $9 Billion Loss", American Banker, November 16. Source: LexisNexis Academic.

Blackwell, Rob, 2005, "Fannie's Compromise: Is It Too Late to Matter?", American Banker, February 9. Source: Business Insights: Essentials.

Blackwell, Rob, 2005, "Senators, Fed Chief Clash Over GSE Caps", American Banker, April 7. Source: Business Insights: Essentials.

Blackwell, Rob and Patrick Rucker, 2006, "Fannie: What OFHEO's Cap Could Mean", American Banker, May 24. Source: LexisNexis Academic.

Blackwell, Rob, 2007, "OFHEO Bends On Limits, But Only a Little", American Banker, September 20. Source: LexisNexis Academic.

Blumberg, Deborah L., 2011, "Treasury Prices Fall Further; Treasury Dept Will Sell Mortgages", Dow Jones Newswires, March 21. Source: Factiva.

Board of Governors of the Federal Reserve System, various years and months, "Federal Reserve Bulletin", Washington, DC: Board of Governors of the Federal Reserve System.

Board of Governors of the Federal Reserve System, various years and months, "Federal Open Market Committee Press Release", Washington, DC: Board of Governors of the Federal Reserve System.

Board of Governors of the Federal Reserve System, various years and months, "Monetary Policy Press Release", Washington, DC: Board of Governors of the Federal Reserve System.

Board of Governors of the Federal Reserve System, various years, "Annual Report of the Board of Governors of the Federal Reserve System", Washington, DC: Board of Governors of the Federal Reserve System.

The Bond Buyer, 1981, "FNMA to Launch Mortgage-Backed Securities Program", July 29. Source: LexisNexis Academic.

Bordo, Michael D. and Joseph G. Haubrich, 2010, "Credit Crises, Money and Contractions: An Historical View", Journal of Monetary Economics 57(1): 1–18.

Bradsher, Keith, 1992, "Vote Near on Regulation Of Fannie and Freddie", The New York Times, June 30. Source: LexisNexis Academic.

Brockman, Joshua, 1999, "Wall Street Watch: Fannie Mae Bids for a Role In Writing Risk Capital Rule", The American Banker, March 2. Source: LexisNexis Academic.

Brouillette, Geoff, 1979, "FHLMC Gears Secondary Market for New Type Loans," The American Banker, July 16. Source: LexisNexis Academic.

Bush, George H.W., 1990, "Statement on Signing the Cranston-Gonzalez National Affordable Housing Act, November 28, 1990", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Bush, George H.W., 1992, "Statement on Signing the Housing and Community Development Act of 1992, October 28, 1992", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Bush, George W., 2002, "Remarks at St. Paul AME Church in Atlanta, Georgia, June 17, 2002", Atlanta, GA. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Bush, George W., 2003, "Remarks on Signing the American Dream Downpayment Act, December 16, 2003", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Bush, George W., 2008a, "Remarks on Signing the Economic Stimulus Act of 2008, February 13, 2008", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Bush, George W., 2008b, "Statement on the Fannie Mae and Freddie Mac Corporations, September 7, 2008", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Business and Finance Daily News Service, 2012, "Fed to take action with weak US economy", September 13. Source: Factiva.

Carter, James E., 1977, "Housing and Community Development Act of 1977 Remarks on Signing H.R. 6655 Into Law, October 12, 1977", Washington, DC.

Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Chung, Joanna and Michael Mackenzie, 2008, "Fannie Mae bounces back after expansion go-ahead by regulator", Financial Times, May 7. Source: Factiva.

Collins, Brian, 2006, "Freddie Now Faces Limits On Portfolio", National Mortgage News, June 5. Source: Factiva.

Collins, Brian, 2009, "Loan Limit: Yes, FTHB: Maybe", National Mortgage News, November 2. Source: LexisNexis Academic.

Colter, Allison B., 2006, "Agency Spreads Little Changed On Freddie Growth Limits", Dow Jones Newswires, August 1. Source: Factiva.

Congressional Budget Office, 1983, "The Housing Finance System and Federal Policy: Recent Changes and Options for the Future", Washington, DC: Congressional Budget Office.

Congressional Budget Office, 1991, "Controlling the Risks of Government-Sponsored Enterprises", Washington, DC: Congressional Budget Office.

Congressional Budget Office, 2005, "Statement of Douglas Holtz-Eakin, Director: Aligning the Costs and Benefits of the Housing Government-Sponsored Enterprises", Testimony before the Committee on Banking, Housing, and Urban Affairs, United States Senate, April 21. Washington, DC: Congressional Budget Office.

Congressional Budget Office, 2015, "Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2014", Washington, DC: Congressional Budget Office.

Congressional Budget Office, 2016, "The Effects of Increasing Fannie Mae's and Freddie Mac's Capital", Washington, DC: Congressional Budget Office.

Congressional Quarterly Almanac 1968, 1969, "Housing Bill Provides Home-Buying, Riot, Other Aid", 24th ed., 14-313-14-335, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1969, 1970, "Housing, Urban Development", 25th ed., 391-98, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1970, 1971, "Congress Clears Emergency Home Finance Act Of 1970", 26th ed., 10-277-10-287, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1973, 1974, "Administration Housing Moratorium Comes Under Fire", 29th ed., 428-32, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1974a, 1975a, "First Major Housing Bill Since 1968 Enacted", Congressional Quarterly, 30th ed., 345-63, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1974b, 1975b, "Housing and Urban Affairs 1974: Overview", Congressional Quarterly, 30th ed., 341-44, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1978, 1979, "Housing Authorization", 34th ed., 303-11, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1980, 1981, "HUD-Independent Agencies", 36th ed., 172-76, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 2008a, 2009, "Details of Mortgage Finance Bill", 64th ed., edited by Jan Austin, 7-13-7-17, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 2008b, 2009, "Treasury Gets Keys to Fannie, Freddie", 64th ed., edited by Jan Austin, 7-9-7-13, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 2009, 2010, "Stimulus Enacted to Pump Economy with $575.3 Billion in New Spending", 65th ed., edited by Jan Austin, 7-3-7-7, Washington, DC: CQ-Roll Call Group.

Congressional Research Service, 2004, "A Chronology of Housing Legislation and Selected Executive Actions, 1892-2003," Washington, DC: US Government Printing Office.

Connor, John, 1999, "Risk-Based Rules For Fannie-Freddie Finally Clear OMB", Dow Jones News Service, March 26. Source: Factiva.

Connor, John, 2006, "CAPITAL VIEWS: Not Every Day You Find Schumer Speechless", Dow Jones Capital Markets Report, May 23. Source: Factiva.

Cowan, Alison L., 2002, "Bill Seeks Openness at Fannie Mae and Freddie Mac", The New York Times, July 12. Source: LexisNexis Academic.

Crittenden, Michael R. and Andrew Edwards, 2008, "Corporate News: Fannie, Freddie to get caps lifted on portfolios", The Wall Street Journal, February 28. Source: Factiva.

Crittenden, Michael R. and Aparajita Saha-Bubna, 2008, "3rd Update: Ofheo To Remove Fannie, Freddie Portfolio Caps", Dow Jones Capital Markets Report, February 27. Source: Factiva.

Dash, Eric, 2004, "Fannie Mae Agrees to Sell Preferred Stock", The New York Times, December 30. Source: LexisNexis Academic.

Dash, Eric, 2005, "Fannie Mae Says It Will Halve Its Dividend for the 1st Quarter", The New York Times, January 19. Source: LexisNexis Academic.

Dash, Eric, 2006, "Regulators Denounce Fannie Mae", The New York Times, May 24. Source: LexisNexis Academic.

Dash, Eric, 2007, "Fannie Mae to Be Allowed to Expand Its Portfolio", The New York Times, September 20. Source: LexisNexis Academic.

Day, Kathleen, 1999, "Agency Proposes New Capital Rules For Fannie Mae", The Washington Post, March 27. Source: LexisNexis Academic.

Day, Kathleen, 2002, "Budget Cites Higher Risks for Fannie Mae, Freddie Mac", The Washington Post, February 6. Source: LexisNexis Academic.

Dennis, Brady, 2012, "New bailout terms for Fannie, Freddie", The Washington Post, August 18. Source: LexisNexis Academic.

Department of Housing and Urban Development, 1983, "The Secondary Market in Residential Mortgages", Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 1987, "1986 Report to Congress on the Federal National Mortgage Association", Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 1995, "The National Homeownership Strategy: Partners in the American Dream", Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 1996, "Privatization of Fannie Mae and Freddie Mac: Desirability and Feasibility, A HUD Report", Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 1999, "Cuomo Announces Action to Provide $2.4 Trillion in Mortgages for Affordable Housing for 28.1 Million Families", HUD News Release No. 99-131, July 29. Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 2000, "HUD Announces New Regulations to Provide $2.4 Trillion in Mortgages for Affordable Housing for 28.1 Million Families", HUD News Release No. 00-317, October 31. Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 2004, "HUD Finalizes Rule on New Housing Goals for Fannie Mae and Freddie Mac", HUD News Release No. 04-133, November 1. Washington, DC: US Department of Housing and Urban Development.

Department of Housing and Urban Development, 2008, "Profiles of GSE Mortgage Purchases in 2001-2004", Office of Research and Policy Development. Washington, DC: US Department of Housing and Urban Development.

Department of Justice, 1985, "Issuance of a Preferred Stock Dividend by the Federal Home Loan Mortgage Corporation: Memorandum Opinion for the Counsel to the Director of the Office of Management and Budget, and the Chairman, Federal Home Loan Bank Board", January 25. Washington, DC: US Department of Justice.

Department of the Treasury, 1990, "Report of the Secretary of the Treasury on

Government Sponsored Enterprises", Washington, DC: US Department of the Treasury.

Department of the Treasury, 1996, "Government Sponsorship of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation", Washington, DC: US Department of the Treasury.

Department of the Treasury, 2005, "Testimony of Secretary John W. Snow Before the U.S. Senate Committee on Banking, Housing and Urban Affairs: Proposals for Housing GSE Reform", Department of the Treasury Office of Public Affairs, April 7, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2008a, "Statement by Secretary Henry M. Paulson, Jr. on Treasury and Federal Housing Finance Agency Action to Protect Financial Markets and Taxpayers", Press Release, September 7, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2008b, "Fact Sheet: GSE Mortgage Backed Securities Purchase Program", Press Release, September 7, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2008c, "Treasury Bulletin: December 2008". Washington, DC: US Government Printing Office.

Department of the Treasury, 2009a, "Homeowner Affordability and Stability Plan Fact Sheet", Press Release, February 18, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2009b, "Statement by Secretary Tim Geithner on Treasury's Commitment to Fannie Mae and Freddie Mac", Press Release, February 18, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2011a, "Frequently Asked Questions on the Treasury's Program to Sell MBS", Washington, DC: US Department of the Treasury.

Department of the Treasury, 2011b, "Agency Financial Report: Fiscal Year 2011", Washington, DC: US Department of the Treasury.

Department of the Treasury, 2012a, "Third Amendment to Amended and Restated Senior Preferred Stock Purchase Agreement", August 17, Washington, DC: US Department of the Treasury.

Department of the Treasury, 2012b, "Treasury Department Announces Further Steps to Expedite Wind Down of Fannie Mae and Freddie Mac", Press Release, August 17, Washington, DC: US Department of the Treasury.

Dow Jones News Service, 1980, "Fannie Mae to Boost Limits on Conventional Mortgages", December 23. Source: Factiva.

Dow Jones News Service, 1986, "FHLMC to Announce Plan to Buy Second Mortgages", January 6. Source: LexisNexis Academic.

Dow Jones News Service, 1991, "House Panel – FNMA, FHLMC Bill -2-", July 30. Source: Factiva.

Dow Jones News Service, 2011, "Market Talk: Fed MBS Demand Could Total $262B Over One Year", September 21. Source: Factiva.

Eckstein, Otto and Allen Sinai, 1986, "The Mechanisms of the Business Cycle in the Postwar Era", in Robert J., Gordon (Ed.), *The American Business Cycle: Continuity and Change*, National Bureau of Economic Research Studies in Business Cycles (25), University of Chicago Press, Chicago, pp. 39–122.

Eichengreen, Barry, 2015, "Hall of Mirrors: The Great Depression, the Great Recession, and the Uses—and Misuses—of History", Oxford University Press, New York, NY.

Elliot, Douglas J., Greg Feldberg, and Andreas Lehnert, 2013, "The History of Cyclical Macroprudential Policy in the United States", US Treasury Department Office of Financial Research, Working Paper No. 8.

Executive Office of the President of the United States, various, "Economic Report of the President: Transmitted to the Congress; Together with the Annual Report of the Council of Economic Advisors", Washington, DC: US Government Printing Office.

Federal Home Loan Mortgage Corporation, various years, "Annual Report of the Federal Home Loan Mortgage Corporation", Washington, DC: Federal Home Loan Mortgage Corporation.

Federal Housing Finance Administration, 2008a, "FHFA Announces Suspension of Capital Classifications During Conservatorship", News Release, October 9, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2008b, "Conforming Loan Limit for U.S. to Remain $417,000 In 2009", News Release, November 7, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2008c, "Fannie Mae's Senior Preferred Stock Purchase Agreement with Treasury (September 2008)", September 26, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2008d, "Statement of FHFA Director James B. Lockhart at News Conference Announcing Conservatorship of Fan-

nie Mae and Freddie Mac", Statement, September 7, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2009a, "First Amendment to Fannie Mae's Senior Preferred Stock Purchase Agreement with Treasury (May 2009)", May 6, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2009b, "Second Amendment to Fannie Mae's Senior Preferred Stock Purchase Agreement with Treasury (December 2009)", December 24, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, 2012, "Third Amendment to Fannie Mae's Senior Preferred Stock Purchase Agreement with Treasury (August 2012)", August 17, Washington, DC: Federal Housing Finance Administration.

Federal Housing Finance Administration, various years and volumes, "Mortgage Market Note", Washington, DC: Federal Housing Finance Administration.

Federal National Mortgage Association, 1969, "Background and History of the Federal National Mortgage Association", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, 1973, "Background and History of the Federal National Mortgage Association", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years, "Annual Report of the

Federal National Mortgage Association", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years, "Form 10-K", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years, "Form 10-Q", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years, "Information Statement", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years and volumes, "MBSenger", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various months, "Monthly Volume Survey", Washington, DC: Federal National Mortgage Association.

Federal National Mortgage Association, various years and volumes, "Offering Circular", Washington, DC: Federal National Mortgage Association.

Fernandez, Tommy, 2002, "In Brief: GSEs Give More Risk-Exposure Detail", The American Banker, April 2. Source: LexisNexis Academic.

Fiderer, David, 2014, "DeMarco Redefined GSE 'Failure' and 'Conservatorship'", National Mortgage News, December 16. Source: LexisNexis Academic.

Fieldhouse, Andrew, Karel Mertens, and Morten O. Ravn, 2017, "The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar US Housing Credit Policy", NBER Working Paper No. 23154.

The Financial Crisis Inquiry Commission, 2011, "The Financial Crisis Inquiry Report: Final Report of the Financial Crisis Inquiry Commission on the Causes of the Financial and Economic Crisis in the United States", Washington, DC: US Government Printing Office.

Ford, Gerald R., 1974a, "Remarks on Signing the Emergency Home Purchase Assistance Act of 1974, October 18, 1974", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Ford, Gerald R., 1974b, "Statement on the Housing and Community Development Act of 1974, August 22, 1974", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Frame, W. Scott, Kristopher Gerardi, and Paul S. Willen, 2015, "The Failure of Supervisory Stress Testing: Fannie Mae, Freddie Mac, and OFHEO", Federal Reserve Bank of Atlanta Working Paper No. 2015-3.

Garver, Rob, 2000, "Risk-Capital Rule For Freddie, Fannie Done, Regulator Says", The American Banker, December 19. Source: LexisNexis Academic.

Goldfarb, Zachary A. and Neil Irwin, 2008, "Market Welcomes Takeover; Stocks Rebound; Critics Question Need for Bailout", The Washington Post, September 9. Source: LexisNexis Academic.

Government Accounting Office, 1985, "The Federal National Mortgage Association in a Changing Economic Environment", Report by the Comptroller General of the United States, RCED-85-102, Washington, DC: US Government Accounting Office.

Government Accounting Office, 1988, "Housing Finance: Agency Issuance of

Real Estate Mortgage Investment Conduits", Report to Congressional Requesters, GGD-88-111, Washington, DC: US Government Accounting Office.

Government Accounting Office, 1991, "Government-Sponsored Enterprises: A Framework for Limiting the Government's Exposure to Risks", Report to the Congress, GGD-91-90, Washington, DC: US Government Accounting Office.

Government Accounting Office, 1996, "Housing Enterprises: Potential Impacts of Severing Government Sponsorship", Report to Congressional Requesters, GGD-96-120, Washington, DC: US Government Accounting Office.

Government Accounting Office, 1998, "Federal Housing Enterprises: HUD's Mission Oversight Needs to Be Strengthened", Report to the Chairman, Subcommittee on Capital Markets, Securities and Government Sponsored Enterprises, Committee on Banking and Financial Services, House of Representatives, GGD-98-173, Washington, DC: US Government Accounting Office.

Government National Mortgage Association, various years, "Annual Report of the Government National Mortgage Association", Washington, DC: US Department of Housing and Urban Development, Government National Mortgage Association.

Gray, Jonathan E., 1990, "Federal National Mortgage Association", Bernstein Research Notes Black Book, May 10, pp. 11–14. Source: Factiva.

Greenspan, Alan, 2005, "Government-sponsored enterprises", Remarks by Chairman Alan Greenspan to the Conference on Housing, Mortgage Finance, and the Macroeconomy, Federal Reserve Bank of Atlanta, Atlanta, Georgia, May 19. Source: Board of Governors of the Federal Reserve System.

Greenspan, Alan, 2007, "The Age of Turbulence: Adventures in a New World", The Penguin Press, New York, NY.

Guerrera, Francesco, Michael Mackenzie, and Saskia Scholtes, 2008, "Fannie-Freddie caps lifted amid deepening gloom", Financial Times, February 28. Source: Factiva.

Guidera, Jerry, 1999, "HUD To Unveil New, Higher Housing Goals For Fannie Mae", Dow Jones News Service, July 28. Source: Factiva.

Hagerty, James R., 2004, "HUD to Slightly Ease Loan Goals For Fannie Mae and Freddie Mac", The Wall Street Journal, November 1. Source: Factiva.

Hagerty, James R., 2005, "Fannie Mae Halves Dividend in Effort To Amass Capital", The Wall Street Journal, January 19. Source: Factiva.

Hagerty, James R., 2005, "Fannie Mae Has Bolstered Its Capital Base", The Wall Street Journal, May 20. Source: Factiva.

Hagerty, James R. and Damian Paletta, 2006, "Freddie Mac Faces Potential Limits On Loan Portfolio", The Wall Street Journal, June 7. Source: Factiva.

Hagerty, James R., 2006, "Regulator Signals Compromise Over Role of Fannie, Freddie — Lockhart Sees Pair Keeping Ability to Stabilize Market, Though on a Smaller Scale", The Wall Street Journal, July 5. Source: Factiva.

Hagerty, James R., Deborah Solomon, and Damian Paletta, 2008, "U.S. Mulls Future of Fannie, Freddie — Administration Ramps Up Contingency Planning as Mortgage Giants Struggle", The Wall Street Journal, July 10. Source: Factiva.

Hagerty, James R., 2012, "The Fateful History of Fannie Mae: New Deal Birth to Mortgage Crisis Fall", The History Press, Charleston, SC.

Haltom, Renee and Robert Sharp, 2014, "The First Time the Fed Bought GSE Debt", Federal Reserve Bank of Richmond Economic Brief 14-04.

Harding, Robin, 2012, "Fannie and Freddie profit deal changed", Financial Times, August 17. Source: Factiva.

Harney, Kenneth R., 1981, "FNMA Has A Capital Idea: FNMA Plans Major Capital Source", The Washington Post, August 8. Source: ProQuest Historical Newspapers.

Haviv, Julie, 2006, "Fannie Mae portfolio limit to benefit Freddie Mac", Reuters News, May 23. Source: Factiva.

Heller, Michele, 2004, "HUD Wants GSEs to Focus More on Poor", The American Banker, April 7. Source: LexisNexis Academic.

Herron, Paul, 1986, "Freddie Mac to Start Buying 2d Mortgages", National Mortgage News, January 13. Source: LexisNexis Academic.

Hilzenrath, David S. and Ben White, 2004, "Fannie Mae Agrees to Accounting Changes", The Washington Post, September 28. Source: LexisNexis Academic.

Hilzenrath, David S., 2005, "Fannie Mae Halves First-Quarter Dividend; Move Designed to Increase Capital", The Washington Post, January 19. Source: LexisNexis Academic.

Hilzenrath, David S., 2007, "Reins Kept on Fannie, Freddie", The Washington Post, August 11. Source: LexisNexis Academic.

Hilzenrath, David S., 2007, "Bernanke Opposes Lift Of Fannie, Freddie Caps", The Washington Post, August 30. Source: LexisNexis Academic.

Hilzenrath, David S., 2008, "OFHEO Questions Mortgage Proposal; Stimulus Bill Would Affect Jumbo Loans", The Washington Post, February 8. Source: LexisNexis Academic.

Hilzenrath, David S., 2008, "Fannie, Freddie Cleared To Buy More Mortgages", The Washington Post, March 20. Source: LexisNexis Academic.

Hilzenrath, David S., 2008, "Fannie Loses $2.2 Billion As Home Prices Fall", The Washington Post, May 7. Source: LexisNexis Academic.

Hoffman, Susan M. and Mark K. Cassell, 2010, "Mission Expansion in the Federal Home Loan Bank System", State University of New York Press, Albany, NY.

Holzer, Jessica and Michael R. Crittenden, 2009, "US Treasury Ends Cap On Potential Aid To Fannie, Freddie", Dow Jones Business News, December 24. Source: Factiva.

House Committee on Appropriations, 1975, "Making Appropriations for the Department of Housing and Urban Development, and for Sundry Independent Executive Agencies for the Fiscal Year Ending June 30, 1976, and the Period Ending September 30, 1976: Conference Report to accompany H.R. 8070", Report No. 94-502, Washington, DC: US House of Representatives.

House Committee on Appropriations, 1977, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1978: Report together with Additional and Dissenting Views to accompany H.R. 7554", Report No. 95-380, Washington, DC: US House of Representatives.

House Committee on Appropriations, 1978, "Making Appropriations for the Department of Housing and Urban Development: Conference Report to accompany H.R. 12936", Report No. 95-1569, Washington, DC: US House of Representatives.

House Committee on Appropriations, 1981, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1982: Report together with Additional Views to accompany H.R. 4034", Report No. 97-162, Washington, DC: US House of Representatives.

House Committee on Appropriations, 1982, "Making Further Continuing Appropriations and Providing for Productive Employment for the Fiscal Year Ending September 30, 1983: Conference Report to accompany H.J. Res. 631", Report No. 97-980, Washington, DC: US House of Representatives.

House Committee on Appropriations, 1982, "Further Continuing Appropriations, 1983: Report to accompany H.J. Res. 631", Report No. 97-959, Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1969a, "Housing and Urban Development Legislation—1969: Hearings Before the Subcommittee on Housing of the Committee on Banking and Currency, House of Representatives, Ninety-First Congress, First Session, July 17, 18, 21, 22, 23, 24, 28, 29, and 30, 1969", Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1969b, "Housing and Urban Development Act of 1969: Conference Report to accompany S. 2864", Report No. 91-740, Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1970, "Emergency Home Finance

Act of 1970: Report together with Additional Views and Individual Views to accompany H.R. 17495", Report No. 91-1131, Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1974, "The Housing and Urban Development Act of 1974: Report together with Dissenting and Supplemental Views to accompany H.R. 15361", Report No. 93-1114, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1977a, "The Housing and Community Development Act of 1977: Report together with Additional Supplemental, Minority and Dissenting Views to accompany H.R. 6655", Report No. 95-236, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1977b, "Housing and Community Development Act of 1977: Conference Report to accompany H.R. 6655", Report No. 95-634, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1979a, "Housing and Community Development Amendments of 1979: Report together with Additional, Minority, Dissenting and Supplemental Views to accompany H.R. 3875", Report No. 96-154, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1979b, "Housing and Community Development Amendments of 1979: Conference Report to accompany H.R. 3875", Report No. 96-706, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1980, "Housing

and Community Development Act of 1980: Report together with Additional Minority, Supplemental, and Dissenting Views to accompany H.R. 7262", Report No. 96-979, Washington, DC: US House of Representatives.

House Committee on Banking, Finance and Urban Affairs, 1989, "Financial Institutions Reform, Recovery and Enforcement Act of 1989: Supplemental Report to accompany H.R. 1278", Report No. 101-54, Part 3, Washington, DC: US House of Representatives.

House Committee on the Budget, 1981, "Omnibus Budget Reconciliation Act of 1981: Conference Report to accompany H.R. 3962", Report No. 97-208, Washington, DC: US House of Representatives.

Hu, Joseph C., 2011, "Asset Securitization: Theory and Practice", John C. Wiley and Sons, Hoboken, NJ.

Hunter, Oakley, 1971, "The Federal National Mortgage Association: Its Response to Critical Financing Requirements of Housing", George Washington Law Review 39(4): 818–834.

Johnson, Lyndon B., 1968, "Remarks Upon Signing the Housing and Urban Development Act of 1968, August 1, 1968", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Johnson, Simon and James Kwak, 2010, "13 Bankers: The Wall Street Takeover and the Next Financial Meltdown", Pantheon Books, New York, NY.

Joint Committee on Taxation, 1984, "General Explanation of the Revenue Provisions of the Deficit Reduction Act of 1984 (H.R. 4170, 98th Congress; Public Law 98-369)", JCS-41-84, Washington, DC: US Government Printing Office.

Jones, William H., 1977, "FNMA Arouses Harris' Ire; Harris Criticizes FNMA For Lack of Urban Loans", The Washington Post, June 8. Source: LexisNexis Academic.

Kopecki, Dawn, 1999, "Freddie Mac Balks At HUD Plan To Expand Low-Income Loans", Dow Jones News Service, July 29. Source: Factiva.

Krishnamurthy, Arvind and Annette Vissing-Jørgensen, 2011, "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy", Brookings Papers on Economic Activity 3(2011): 215–265.

Labaton, Stephen, 2008, "Worst Fears Ease, for Now, On Mortgage Giants' Fate", The New York Times, July 12. Source: LexisNexis Academic.

Labaton, Stephen and Andrew Ross Sorkin, 2008, "U.S. Rescue Seen at Hand For Two Mortgage Giants", The New York Times, September 6. Source: LexisNexis Academic.

LaGesse, David, 1984, "Freddie Mac's Stock Transfer Not Just Trick; Effect of Issue Is Marginal 'But Every Little Bit Helps'", The American Banker, December 11. Source: LexisNexis Academic.

LaGesse, David, 1986, "Freddie Mac Offers to Buy 2nd Mortgages", The American Banker, January 8. Source: LexisNexis Academic.

Leamer, Edward E., 2007, "Housing IS the Business Cycle", NBER Working Paper No. 13428.

Lehman, H. Jane, 1991, "Housing Plan To Aid Poor Is Studied; Fannie Mae, Freddie Mac Possible Sources of Funds", The Washington Post, July 27. Source: Factiva.

Lehnert, Andreas, Wayne Passmore, and Shane M. Sherlund, 2008, "GSEs, Mortgage Rates, and Secondary Market Activities", Journal of Real Estate Finance and Economics 36(3): 343–363.

Levy, Claudia, 1981, "FHLMC Wants to Sell Stock to Lenders", The Washington Post, July 13. Source: LexisNexis Academic.

Mahmudova, Anora and Barbara Kollmeyer, 2013, "Wall Street points higher as Fed decision looms", MarketWatch, December 18. Source: Factiva.

Market News International, 2007, "US OFHEO Text: Giving GSEs Portf Flexibility, Not Lifting Caps", September 19. Source: Factiva.

MarketWatch, 2008, "Fannie, Freddie to buy a lot more mortgages - report; Finance giants reportedly ordered to buy $40 bln of mortgage bonds a month", MarketWatch, October 11. Source: Factiva.

Matthews, Gordon, 1980, "FHLMC Moves Toward Secondary Market for RRMs", The American Banker, May 14. Source: LexisNexis Academic.

Maxwell, David O., 1981, "Fannie Mae Mortgage Purchase Program Cut Back; FNMA Seeking Thrift, Bank Customers for Mortgage Buying", The American Banker, October 26. Source: LexisNexis Academic.

McCue, Lisa J., 1981, "FHLMC to Start Purchasing ARMs On July 1; Negative Amortization Ban Worries the S&L Industry", The American Banker, May 29. Source: LexisNexis Academic.

McCue, Lisa J., 1981, "FNMA Entering 2d Mortgage Field; Will Buy in States Where Legal", The American Banker, November 20. Source: LexisNexis Academic.

McKinnon, John D. and James R. Hagerty, 2004, "Fannie Mae Overseer to Present Report Criticizing Accounting — Probe Points to Decisions To Smooth Out Earnings, Possibly Increase Bonuses", The Wall Street Journal, September 20. Source: Factiva.

McLean, Bethany, 2015, "Shaky Ground: The Strange Saga of the U.S. Mortgage Giants", Columbia Global Reports, New York, NY.

McQueen, Michel, 1987, "Fannie Mae Gets U.S. Clearance On New Security", The Wall Street Journal, April 22. Source: Factiva.

McQueen, Michel and Mary Lu Carnevale, 1988, "HUD Chief Eases Fannie Mae Curbs On Remic Issuance", The Wall Street Journal, April 21. Source: Factiva.

McTague, Jim, 1987, "$75 Billion Cap on Freddie Mac Is Not Firm, Official Maintains", The American Banker, March 10. Source: LexisNexis Academic.

McTague, Jim, 1987, "Fannie Mae's Limit Expected to Spur Remic Market, but Skepticism Lingers", The American Banker, April 23. Source: Factiva.

Mullins, Luke, 2007, "Schumer Pushes Removal of GSE Caps", American Banker, August 17. Source: LexisNexis Academic.

Munnell, Alicia H., Lynn E. Browne, James McEneaney, and Geoffrey M.B. Tootell, 1996, "Mortgage Lending in Boston: Interpreting HMDA Data", American Economic Review 86(1): 25-53.

Muolo, Paul, 1991, "HUD's Kemp Blasts Legislation on GSEs", National Mortgage News, September 23. Source: LexisNexis Academic.

Nash, Nathaniel C., 1988, "Freddie Mac Clears Stock Sale", The New York Times, July 14. Source: LexisNexis Academic.

National Mortgage News, 1985, "FHLMC Seeks Wide Ownership", December 23. Source: LexisNexis Academic.

National Mortgage News, 1996, "OFHEO Issues GSE Capital Rule", July 15. Source: LexisNexis Academic.

National Mortgage News, 1997, "Fannie Boasts Surplus Capital", June 2. Source: LexisNexis Academic.

National Mortgage News, 2005, "No Surprise: Fannie Purchases Slow as It Raises More Capital", January 17. Source: Factiva.

National Mortgage News, 2006, "Analysts See an Improving Outlook for Fannie Mae, Freddie Mac", May 22. Source: Factiva.

Nixon, Richard M., 1970, "Statement on Signing the Emergency Home Finance Act of 1970, July 24, 1970", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Nixon, Richard M., 1973a, "State of the Union Message to the Congress on Community Development, March 8, 1973", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Nixon, Richard M., 1973b, "Special Message to the Congress Proposing Legislation and Outlining Administration Actions To Deal With Federal Housing Policy, September 19, 1973", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Nixon, Richard M., 1974, "Statement About Plans and Pending Legislation To Revitalize the Housing Market, May 10, 1974", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Obama, Barack H., 2009a, "Statement on Signing the American Recovery and Reinvestment Act of 2009, February 17, 2009", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Obama, Barack H., 2009b, "Remarks by the President on the Mortgage Crisis, February 18, 2009", Mesa, AZ. Source: The White House, Briefing Room, Speeches and Remarks.

Office of Federal Housing Enterprise Oversight, 1998, "Evaluating the Capital Adequacy of Freddie Mac and Fannie Mae", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2003, "Report of the Special Examination of Freddie Mac", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2004a, "Report of Findings to Date: Special Examination of Fannie Mae", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2004b, "Fannie Mae Directors Agree to Correct Accounting Treatments, Raise Capital Surplus as Required by OFHEO", News Release, September 27, Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2004c, "OFHEO Classifies Fannie Mae as Significantly Undercapitalized for Third Quarter 2004", News

Release, December 21, Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2004d, "OFHEO Directs Freddie Mac to Maintain Mandatory Target Capital Surplus Pre-Approval Required for Certain Corporate Transactions", News Release, January 29, Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2006a, "Report of the Special Examination of Fannie Mae", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2006b, "Fannie Mae Façade: Fannie Mae Criticized for Earnings Manipulation", News Release, May 23, Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, 2007, "OFHEO Provides Flexibility on Fannie Mae, Freddie Mac Mortgage Portfolios", News Release, September 19, Washington, DC. Source: Financial Crisis Inquiry Commission.

Office of Federal Housing Enterprise Oversight, 2008, "OFHEO, Fannie Mae and Freddie Mac Announce Initiative to Increase Mortgage Market Liquidity", News Release, March 19, Washington, DC. Source: Financial Crisis Inquiry Commission.

Office of Federal Housing Enterprise Oversight, various years, "Annual Report to Congress", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, various years, "Mortgage Market Note", Washington, DC. Source: Federal Housing Finance Agency.

Office of Federal Housing Enterprise Oversight, various years, "Mortgage Markets and the Enterprises", Washington, DC. Source: Federal Housing Finance Agency.

Office of Management and Budget, various years, "Budget of the United States Government", Washington, DC: US Government Publishing Office.

Office of the Special Inspector General for the Troubled Asset Relief Program, 2009, "Initial Report to the Congress", February 6, Washington, DC: Office of the Special Inspector General for the Troubled Asset Relief Program.

Owens, Raymond E. and Stacey L. Schreft, 1993, "Identifying Credit Crunches", Federal Reserve Bank of Richmond Working Paper 93-02.

Paletta, Damian, 2005, "Fed Chief Wants Portfolio Cap on Fannie, Freddie", American Banker, February 18. Source: Factiva.

Paletta, Damian, 2006, "Report To Recommend Limiting Fannie Mae's Growth – Sources", Dow Jones Newswires, May 22. Source: Factiva.

Paletta, Damian, 2008, "Plans Would Boost Funds For Mortgages", The Wall Street Journal, March 18. Source: Factiva.

Pitt, Harvey L., "Statement By SEC Chairman: On Fannie Mae/Freddie Mac", July 12, Washington, DC: US Securities and Exchange Commission.

Prakash, Snigdha, 1993, "Fannie Says It's 'Hard-Pressed' To Meet Targets", The American Banker, August 12. Source: LexisNexis Academic.

Prakash, Snigdha, 1993, "HUD Sticks to Affordable-Housing Goals", The American Banker, October 14. Source: LexisNexis Academic.

Prakash, Snigdha, 1994, "Higher Housing Goals For Freddie and Fannie Deferred Until Mid-'95", The American Banker, December 2. Source: LexisNexis Academic.

Prakash, Snigdha, 1995, "Freddie Mac Misses HUD's 30% Target For Central Cities; Fannie Hits the Mark", The American Banker, March 9. Source: LexisNexis Academic.

The President's Commission on Housing, 1982, "The Report of The President's Commission on Housing", April 29, Washington, DC: The President's Commission on Housing.

Purushothaman, Shoba, 1988, "Fannie Mae Receives Broad Authority From HUD Secretary to Issue Remics", The Wall Street Journal, October 14. Source: Factiva.

Quint, Michael, 1988, "Freddie Stock Plan Is Proposed", The New York Times, June 7. Source: LexisNexis Academic.

Randall, Maya Jackson, 2009, "US GSEs To Play Critical Role In War Against Foreclosures", Dow Jones News Service, February 18. Source: Factiva.

Reuters News, 1992, "FNMA, Countrywide to Provide $1.25 Bln for Lending", May 14. Source: Factiva.

Reuters News, 2004, "Bush reelection chills Freddie, Fannie stock", November 3. Source: Factiva.

Reuters News, 2008, "Fannie, Freddie have won capital relief – sources", March 18. Source: Factiva.

Reuters News, 2012, "U.S. revamp of Fannie, Freddie bailout eases dividend burden", August 17. Source: Factiva.

Roosevelt, Phil, 1988, "S&Ls Bide Time On Freddie Mac Stock Program", The American Banker, November 22. Source: LexisNexis Academic.

Rosenberg, Hilary, 2001, "Fannie Mae CEO Poised For Fresh Onslaught", The American Banker, January 31. Source: LexisNexis Academic.

Ross, Nancy L., 1978, "Bill Approved For New Loan Sales to FHLMC," The Washington Post, May 13. Source: LexisNexis Academic.

Ross, Nancy L., 1981, "U.S. Agency Clears Way for Sale of Adjustable-Rate Mortgages; Agency Backs Sliding-Rate Mortgage Sales", The Washington Post, June 26. Source: LexisNexis Academic.

Rucker, Patrick, 2006, "In Brief: Bernanke Urges Cutting GSEs' Debt", American Banker, April 28. Source: LexisNexis Academic.

Rucker, Patrick and Rob Blackwell, 2006, "OFHEO Chief Has a Goal: Break GSE Deadlock; Aims to get reform legislation through Congress in 2006", American Banker, July 7. Source: Factiva.

Senate Committee on Appropriations, 1975, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1976: Report to accompany H.R. 8070", Report No. 94-326, Washington, DC: US Senate.

Senate Committee on Appropriations, 1978, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1979: Report to accompany H.R. 12936", Report No. 95-1060, Washington, DC: US Senate.

Senate Committee on Appropriations, 1979, "Report to accompany H.R. 4394", Report No. 96-268, Washington, DC: US Senate.

Senate Committee on Appropriations, 1980, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1981: Report to accompany H.R. 7631", Report No. 96-926, Washington, DC: US Senate.

Senate Committee on Appropriations, 1981, "Department of Housing and Urban Development–Independent Agencies Appropriation Bill, 1982: Report to accompany H.R. 4034", Report No. 97-163, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1966, "Regulation of Maximum Rates of Interest Paid on Savings: Report to accompany H.R. 14206", Report No. 89-1601, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1968, "Housing and Urban Development Act of 1968: Report to accompany S. 3497 Together with Individual and Additional Views", Report No. 90-1123, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1969, "Expanding the Mortgage Market: Report to accompany S. 2577 (Together with Minority and Individual Views)", Report No. 91-516, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1970, "The Emergency Home Financing Act of 1970: Report to accompany S. 3685 together with Minority and Supplemental Views", Report No. 91-761, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1974a, "Home Purchase Assistance Act of 1974: Report together with Minority Views to accompany S. 3979", Report No. 93-1223, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1974b, "Housing and Community Development Act of 1974: Report to accompany S. 3066 together with Supplemental and Additional Views", Report No. 93-693, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1976a, "Secondary Market Operations of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation: Hearings before the Committee on Banking, Housing and Urban Affairs, Ninety-Fourth Congress, Second Session, December 9, 10, and 13, 1976", Statement of FNMA President Oakley Hunter, December 13, Washington, DC: US Government Printing Office.

Senate Committee on Banking, Housing and Urban Affairs, 1976b, "GNMA Tandem Plan: Hearings before the Committee on Banking, Housing and Urban Affairs, Ninety-Fourth Session, Second Session, To Conduct Oversight on the Governmental National Mortgage Association Tandem Plan, September 20, 21, and 22, 1976", Washington, DC: US Government Printing Office.

Senate Committee on Banking, Housing and Urban Affairs, 1977, "Housing and Community Development Act of 1977: Report to accompany S. 1523 together with Additional Views", Report No. 95-175, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1978, "Housing and Community Development Amendments of 1978: Report to accompany S. 3084 together with Additional Views," Report No. 95-871, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1979, "Housing and Community Development Amendments of 1979: Report to accompany S.

1149 together with Additional Views", Report No. 96-164, Washington, DC: US Senate.

Senate Committee on Banking, Housing and Urban Affairs, 1983, "The Secondary Mortgage Market Enhancement Act of 1983: Report to accompany S. 2040 together with Additional Views", Report No. 98-293, Washington, DC: US Senate.

Senate Committee on Banking, Housing, and Urban Affairs, 1992, "Federal Housing Enterprises Regulatory Reform Act of 1992: Report to accompany S. 2733 together with Additional Views", Report No. 102-282, Washington, DC: US Senate.

Senate Committee on Banking, Housing, and Urban Affairs, 2008, "President Signs Dodd's Legislation to Help Homeowners, Strengthen Economy," News Release, July 30, Washington, DC: US Senate.

Shah, Neil, 2006, "Freddie Mac's Mortgage Portfolio Grows 14.0% In April", Dow Jones Capital Markets Report, May 24. Source: Factiva.

Shah, Neil, 2006, "Freddie's Syron: Portfolio Growth Limitations Possible", Dow Jones Capital Markets Report, May 30. Source: Factiva.

Shah, Neil, 2006, "Freddie Mac's Mortgage Portfolio Down 1.2% In May", Dow Jones Capital Markets Report, June 27. Source: Factiva.

Shellock, Dave, 2014, "Positive earnings reports drive US stocks higher ahead of Fed decision; Global overview", Financial Times, October 29. Source: Factiva.

Shenn, Jody, 2006, "Freddie Mortgage Holdings Dip", American Banker, July 25. Source: LexisNexis Academic.

Shin, Annys, 2005, "White House Sets Forth Plan To Limit Size of Fannie, Freddie", The Washington Post, May 20. Source: Factiva.

Sichelman, Lew, 1996, "OFHEO: GSEs Will Need More Capital, But Loan Rates Won't Rise", National Mortgage News, September 23. Source: LexisNexis Academic.

Slater, Karen, 1981, "FNMA to Reveal Adjustables Plan", The American Banker, June 24. Source: LexisNexis Academic.

Sloan, Steven and Jody Shenn, 2006, "Freddie's 'Voluntary' Cap Also a More Flexible One", American Banker, August 2. Source: LexisNexis Academic.

Sloan, Steven, 2007, "Investors Lift GSEs on Talk of Portfolio Growth", American Banker, August 8. Source: LexisNexis Academic.

Sloan, Steven, 2007, "Bill to Add GSE Powers Proposed in Loan Crisis", American Banker, September 11. Source: LexisNexis Academic.

Sloan, Steven, 2007, "OFHEO: No Change To Conforming Limit", American Banker, November 28. Source: LexisNexis Academic.

Solomon, Deborah and James R. Hagerty, 2006, "Treasury Weighs Move to Rein In Fannie, Freddie — Threat to Curb Portfolio Suggests White House Bid To Pressure Congress to Act", The Wall Street Journal, June 14. Source: Factiva.

Solomon, Deborah and Damian Paletta, 2008, "U.S. Near Deal on Fannie, Freddie—Plan Could Amount to Government Takeover; Management Shakeup Is Expected", The Wall Street Journal, September 6. Source: Factiva.

Sparshott, Jeffrey, 2011, "UPDATE: Treasury To Wind Down Mortgage-Backed Securities Portfolio", Dow Jones Business News, March 21. Source: Factiva.

Stiglitz, Joseph E., Jonathan M. Orszag, and Peter R. Orszag, 2002, "Implications of the New Fannie Mae and Freddie Mac Risk-based Capital Standard", Fannie Mae Papers, 1(2): 1–10.

Story, Louise, 2009, "New Aid For Fannie And Freddie", The New York Times, December 25. Source: LexisNexis Academic.

Strachan, Stan, 1985, "OMB Calls FHLMC Stock Plan Unlawful,' Asks Justice Probe", National Mortgage News, January 7. Source: LexisNexis Academic.

Strachan, Stan, 1987, "Budget Seeks Agency Loan Limit Freeze", National Mortgage News, January 12. Source: LexisNexis Academic.

Strachan, Stan, 1987, "FNMA Gets OK on $15B Of REMICs", National Mortgage News, April 27. Source: LexisNexis Academic.

Teeley, Sandra E., 1981, "Mobile-Home Financing: No Longer Trailing Behind; Mobile Home Loans Increase; FNMA To Buy Mobile Home Mortgages; Fannie Mae Mobile Home Loans Increase", The Washington Post, August 15. Source: LexisNexis Academic.

Vickery, James and Joshua Wright, 2013, "TBA Trading and Liquidity in the Agency MBS Market", Federal Reserve Bank of New York Economic Policy Review, 19(1): 1–18.

Wallace, Evelyn, 1987, "Federal Home Loan Bank Board Lifts Limit on Loan Purchases by Freddie Mac", The Bond Buyer, September 15. Source: LexisNexis Academic.

The Wall Street Journal, 1970, "Fannie Mae to Enter Conventional Mortgage Market in February", December 3. Source: ProQuest Historical Newspapers.

The Wall Street Journal, 1971, "Fannie Mae Gets Nod On Mortgage Forms For Secondary Market: Romney Has Approved the Blanks, Which Are Seen Having Wide Role, Held 'Consumer Oriented'", November 15. Source: ProQuest Historical Newspapers.

The Wall Street Journal, 1971, "Fannie Mae to Open New Secondary Mart For Mortgages Feb. 14", December 16. Source: ProQuest Historical Newspapers.

The Washington Post, 1978, "FNMA Broadens Loan-Buying Program", January 21. Source: ProQuest Historical Newspapers.

The Washington Post, 1978, "Fannie Mae Now Back in Business To Buy Mortgages", February 11. Source: LexisNexis Academic.

The Washington Post, 1980, "2 Mortgage Ceilings Rise", January 4. Source: LexisNexis Academic.

Weil, Jonathan, 2004, "Fannie's Woes Threaten Level Of Core Capital", The Wall Street Journal, September 27. Source: Factiva.

Weiss, N. Eric and Mark Jickling, 2008, "The Conforming Loan Limit", Report No. RS22172. Washington, DC: Congressional Research Service.

Welling, Kathryn M., 1990, "Fannie and Freddie — Uncle Sam Is Not About To Put Them Out of Business", Barron's, May 21. Source: Factiva.

Wessel, David, 2009, "In Fed We Trust: Ben Bernanke's War on the Great Panic", Crown Business, New York, NY.

White, Ben, 2006, "Fannie Mae agrees to limit asset growth", Financial Times, May 24. Source: Factiva.

Wooten, James M., 1981, "Reagan Diminishing 'High Social Priority of Housing'", The American Banker, October 18. Source: LexisNexis Academic.

Yoon, Al, 2011, "UPDATE: Fed Surprise Jolts Mortgage Bond Market, Prices Rally", Dow Jones News Service, September 21. Source: Factiva.

Zigas, David, 1987, "Freddie Mac Activity Is Restricted As Bank Board Hits New Products", The Bond Buyer, March 9. Source: LexisNexis Academic.

Zigas, David, 1987, "Fannie Mae Gets Limited Approval Of HUD's Pierce To Issue Remics", The Bond Buyer, April 22. Source: LexisNexis Academic.

Zuckman, Jill, 1991, "The $50,000 Question", Congressional Quarterly Weekly Report, August 3, Vol. 49, No. 31. Source: Factiva.

APPENDIX A

APPENDICES TO CHAPTER 1

Appendix A1: Historical Background

This appendix provides some more historical background to the evolution of agency market shares depicted in Figure 1.1.[1] During the Depression, the Home Owners' Loan Corporation took ownership of nearly 15 percent of mortgage debt. Housing and homeownership reemerged as a priority at the end of WWII, which is reflected in the strong growth of Fannie holdings in the late 1940s until the Korean War again shifted priority away from housing. A struggling Fannie was rechartered as a mixed private-public ownership corporation in 1954. In 1968, Fannie Mae was split into a publicly listed private corporation and a government-owned Ginnie Mae. In the 1970s, Fannie expanded almost without interruption and the agencies mortgage holdings reached close to 10 percent of total mortgage debt. However, Fannie's large debt-financed balance sheet incurred heavy losses after interest rates rose sharply in 1979. Profitability was only restored through a strategy of aggressive portfolio expansion and by entering the securitization business. At its creation in 1970, ownership of Freddie Mac was restricted to the savings and loans, which had no interest in creating a competitor. As a result, Freddie focused on the securitization of conventional loans, maintaining only a relatively modest mortgage portfolio for warehousing until the late 1980s. In the second half of the 1980s, rising delinquencies and a more hostile attitude of the Reagan administration towards the GSEs led to a reduction in the agencies' market share.

[1] Table 1.1 contains references to various books an articles that contain more comprehensive overviews.

Various reforms in the aftermath of the 1980s S&L crisis set the stage for a prolonged rise in agency activity in the 1990s and early 2000s, and by 2002, the agencies held close to one quarter of the total outstanding mortgage debt on their portfolios. In 1989, Freddie was turned into a publicly traded company with therefore the same profit incentives for balance sheet growth as Fannie, while the Federal Home Loan Banks were granted permission to invest in MBS. Prudential regulations were tightened for private banks, but remained light for the GSEs despite a 1992 reform. The agencies increasingly retained their own and acquired each other's MBS, as opposed to selling them to private investors. As part of an ambitious homeownership strategy, the Clinton administration was supportive of the efforts by Fannie and Freddie to develop automated underwriting systems and ramped up affordable housing goals for their purchases.

The rapid rise in agency ownership of mortgage debt increasingly became a cause of concern with public officials, and in the wake of the Enron scandal Fannie and Freddie were required to start filing reports with the Securities and Exchange Commission. Allegations of accounting fraud in 2003 prompted an investigation by regulators, leading to capital surcharges in the fall of 2004 and settlements that included portfolio caps in 2006. This contributed to a sharp fall in the agencies' market share, which declined 10 percentage points from 2003 to 2007. During the turmoil in mortgage markets in 2007, the portfolio caps and capital surcharges were relaxed, allowing the agencies to step up purchasing activity. In early September 2008, Fannie and Freddie were taken into conservatorship by the Federal Housing Finance Agency and the Treasury Department.

The 2008 conservatorship agreement allowed for continued GSE balance

sheet growth in the short run, but also mandated a long-run wind-down of their portfolios at an annual rate of 10 percent, increased to 15 percent in 2012, until they reaching $250 billion each. The day after the agreement, the Treasury announced its own MBS purchase program, while the Federal Reserve's MBS program was launched a few weeks later. As a result of the Fed and Treasury programs, the combined agency ownership share regained levels similar to the early 2000s despite a gradual decline in holdership by the traditional housing agencies. In contrast, Fannie and Freddie have been allowed to grow their MBS guarantee book essentially without limits. Since the financial crisis, the vast majority of conforming loans originated have been acquired, guaranteed, and sold off in MBS by the agencies.

Appendix A2: An Alternative Identification Strategy Using GSE Excess Returns

Although our narrative instrument is a good predictor of agency purchasing activity, it is based on relatively few policy events. To gain confidence that our results are not driven by the small sample size, as well as to address other potential concerns with the narrative identification method, in this appendix we present results based on a complementary identification approach. Under this alternative approach, we instrument measures of agency purchasing activity with innovations in Fannie and Freddie excess stock returns. This strategy is inspired by Fisher and Peters (2010), who use excess return innovations in major US defense stocks as a measure of news shocks to military spending.

The special advantages granted by federal housing credit policy are likely

to account for much of Fannie and Freddie's market value and portfolio size. This is supported by Passmore (2005), who estimates that 44 percent to 89 percent of Fannie's and Freddie's stock market value is derived from their special GSE status, and that the GSEs would hold far fewer mortgages in portfolio, and have higher capital ratios, if they were purely private. Based on this, we can expect that idiosyncratic movements in Fannie's and Freddie's stock prices reflect unanticipated changes in the value of the GSE status and expected purchasing activity. More specifically, any news about changes in the policies guiding the GSEs' portfolios business and leverage will affect their market value relative to the private sector. Fieldhouse and Mertens (2017) provide narrative evidence that announcements of housing credit policy changes are generally associated with adjustments in GSE stock prices. Below, we use our narrative indicator of federal housing credit policy changes to confirm that news about policy interventions affecting GSE balance sheets indeed affect Fannie's and Freddie's stock market valuation. After accounting for the usual covariance with real estate and banking sectors and the market as a whole, and after controlling for credit aggregates, interest rates, and other macro variables, we find that residual variation in Fannie and Freddie stock returns predicts agency mortgage purchases. This motivates us to use shocks to GSE excess returns as an alternative instrumental variable for agency mortgage purchasing activity.

Empirical Specification using the GSE Excess Returns Instrument

GSE excess returns shocks er_t^{GSE} are defined as the residual in the following regression:

$$ER_t^{GSE} = \tilde{\alpha} + \tilde{\zeta} W_t + \tilde{\varphi}(L) Z_{t-1} + er_t^{GSE} \tag{A.1}$$

where ER_t^{GSE} is the log ratio of the GSE stock price index over the market index.[2] The vector W_t contains a number of contemporaneous controls, including several excess return measures from the Fama-French data library. In our benchmark specification, we include excess returns for the market index and a real estate portfolio. In appendix IV, we also look at specifications adding excess returns on banking or finance sector portfolios or the Fama and French (1993) size and value factors, with little impact on the results. Besides the return variables, W_t also includes contemporaneous values of the control variables used for the narrative specifications, i.e. the interest rate variables (3-month T-bill, 10-year Treasury, the conventional rate, BAA spread), the log of real originations, the log changes in mortgage debt, real house prices, the core PCE price index and personal income, the log of housing starts, and the unemployment rate. For the results below, when we rotate in another variable, we also include it in W_t. Finally, the vector Z_t with lagged controls is the same as in (1.3), but we also add lags of ER_t^{GSE} as well as (cumulative) Fama-French excess market returns.[3] All results involving GSE stock returns are based on monthly data from September

[2]The GSE stock price index from 1970 through 1988 is based on Fannie stock. Post 1988 it is the geometric average of Fannie and Freddie stock (from Bloomberg). The market and sector return variables are based on value-weighted portfolios and exclude dividends, and were downloaded from the data library on the homepage of Kenneth French at `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french`.

[3]Further adding real estate sector excess returns to Z_t had no material impact on the results.

1970 to December 2006. The start of the effective sample is September 1971, reflecting the twelve lags and the fact that Fannie stock was traded for the first time on the NYSE on August 31, 1970.

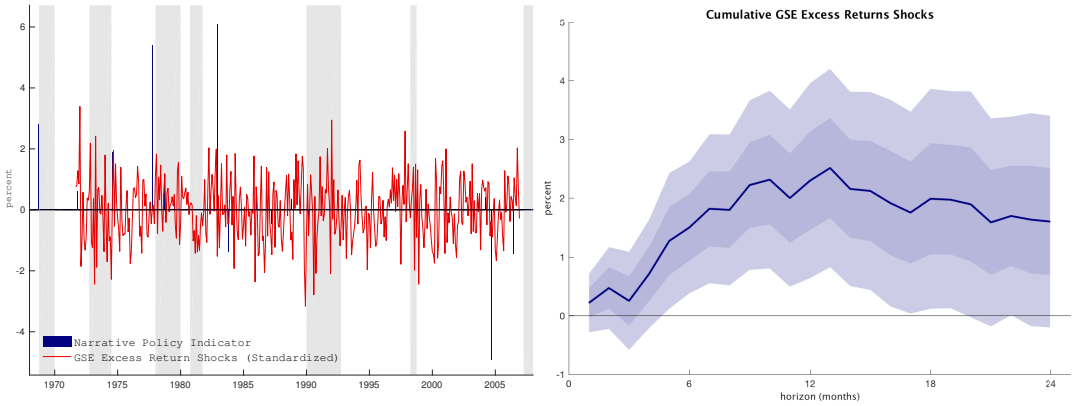

Figure A.1. GSE Excess Returns Shocks $\widehat{er}_t^{GSE}$ and Response to Anticipated Agency Purchases Shock

Notes: The left panel shows the estimated residuals in the GSE excess returns regression in (A.1), as well as the indicator for non-cyclical policy changes. Shaded areas are credit crunch periods, see the data appendix for the chronology. The right panel shows the cumulative response of $\widehat{er}_t^{GSE}$ to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the non-cyclical narrative policy indicator, see equation (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

The left panel in Figure A.1 plots the (standardized) estimated innovations $\widehat{er}_t^{GSE}$, together with the non-cyclical narrative indicator for reference. To provide evidence that GSE stock prices reflect policy-induced changes in agency purchasing activity, the right panel in Figure A.1 plots the cumulative response of GSE excess returns measures to a one pp. increase in the expected future agency market share, measured by agency commitments as a ratio of trend originations. The response, which is estimated by (1.3) using the narrative policy indicator as the instrument, reveals a clear and significant rise in the GSE stock prices after accounting for the comovement with the overall market and real estate sector as well as for all other macro and financial factors included as controls.

To obtain the effect of a shock to anticipated agency purchases, we estimate the following regressions:

$$y_{t+h} - y_{t-1} = \alpha_h + \delta_h \left(\frac{12}{8} \times \frac{\sum_{j=0}^{7} \mathrm{P}_{t+j}}{\tilde{X}_t} \right) + \zeta_h W_t + \varphi_h(L) Z_{t-1} + u_{t+h} \qquad \text{(A.2)}$$

where the right hand side variable of interest measures annualized agency commitments made over an 8 month period, expressed as a ratio of $\tilde{X}_t$, a long-run trend in annualized originations. The response coefficient δ_h in (A.2) is estimated using 2SLS using ER_t^{GSE} as the instrumental variable. Because (A.2) includes the same regressors W_t and (lags of) Z_t as in (A.1), this is equivalent to using the estimated values of er_t^{GSE} as the instrumental variable. However, including the same controls as in (A.1) and instrumenting with ER_t^{GSE} makes it straightforward to obtain the correct standard errors. For simplicity, we keep the horizon for cumulating commitments in equation (A.2) at 8 months, the same as in equation (1.3). The value of the first-stage robust F-statistic for this horizon is 7.09. The GSE excess returns shocks are therefore followed by statistically significant increases in agency purchasing activity. Figure A.2 shows the F-statistics associated with both commitments and effective purchases for horizons up to 60 months. The F-statistic for the GSE excess returns instrument is the highest for agency commitments at a horizon of 10 months, and equals 7.96. Changing the horizon for cumulating commitments in specification (A.2) to 10 months does not lead to any meaningful change in the results.

The excess returns identification approach is analogous to Fisher and Peters (2010), who interpret innovations in excess stock returns of major defense contractors as news shocks about future military spending. They obtain these innovations by ordering the excess returns last in a recursively identified structural vector autoregressive system (SVAR). The recursive scheme assumes that none of the endogenous macro aggregates included in the analysis are affected

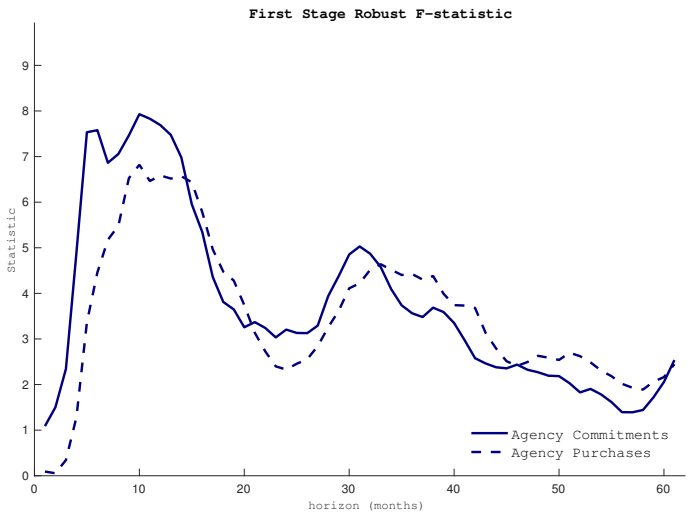

Figure A.2. First-Stage Diagnostics for GSE Excess Returns Instrument

Notes: The figure shows Newey and West (1987) robust F-statistics of the first-stage regressions of cumulative agency commitments and purchases, respectively, for the GSE excess returns variable ER_t^{GSE} with the controls W_t and (lags of) Z_t. Sample: Sep 1970 to Dec 2006.

on impact by the news shock, while excess stock returns react contemporaneously to all macroeconomic shocks. Because the monthly innovation er_t^{GSE} is orthogonalized to the innovations to all of the variables included in W_t, the 2SLS regression in (A.2) similarly imposes that shocks to expected agency purchases have no contemporaneous impact on the variables in W_t. By assumption, this step eliminates other endogenous influences by allowing the GSE excess returns to respond contemporaneously to market or real estate sector returns, in addition to the innovations in mortgage credit, interest rates, prices, and the cyclical indicators. While the assumption of a zero contemporaneous effect on these variables seems ex ante restrictive, it is not rejected by the narrative instrument, see Figures 1.7, 1.8, and 1.10. In appendix IV, we implement the same strategy in a recursive SVAR as in Fisher and Peters (2010), which yields estimates that are very similar those of Figure A.3. In the SVAR, the contribution to the short-run variability of mortgage credit and housing starts is substantial and similar to that of monetary policy shocks.

Because the GSE excess returns instrument has monthly observations, it contains potentially more information about variation in agency purchases than the narrative policy indicator.[4] Our narrative indicator contains, for instance, little information for the 1990s because of the scarcity of quantifiable and binding regulatory changes. However, this period witnessed a rapid expansion of GSE balance sheets and may be particularly important for learning the effects of agency purchases. As is well known, however, equity prices are volatile, and the GSE excess return shocks are, on the other hand, also relatively noisy. While the GSE excess returns shocks clearly have predictive power for agency commitment activity, the first-stage F-statistics are somewhat lower than for the narrative instrument. Another caveat is that the GSE excess returns shocks may also pick up unanticipated variation in the scale of the GSEs' securitization business. Nevertheless, we view this identification strategy as a useful alternative to the narrative approach.

Results using GSE Excess Returns Shocks as an Alternative Instrument

Figure A.3 summarizes the responses of mortgage credit, interest rates, and other macro variables to news about higher future purchases identified using the GSE excess returns shocks instrument. The impulse responses are directly comparable to those reported in Figures 1.7 and 1.10 for the narrative instrument. The GSE excess returns shocks generally yield responses that are less delayed and more transitory for some variables. The main finding, however, is

[4] Assuming the GSE excess returns shocks contain all of the information about agency purchase shocks, it becomes possible to estimate the variance contribution of these shocks to any endogenous variables of interest. In appendix IV, we do this in the context of an SVAR model.

that they are overall remarkably similar in size and direction across both identification strategies.

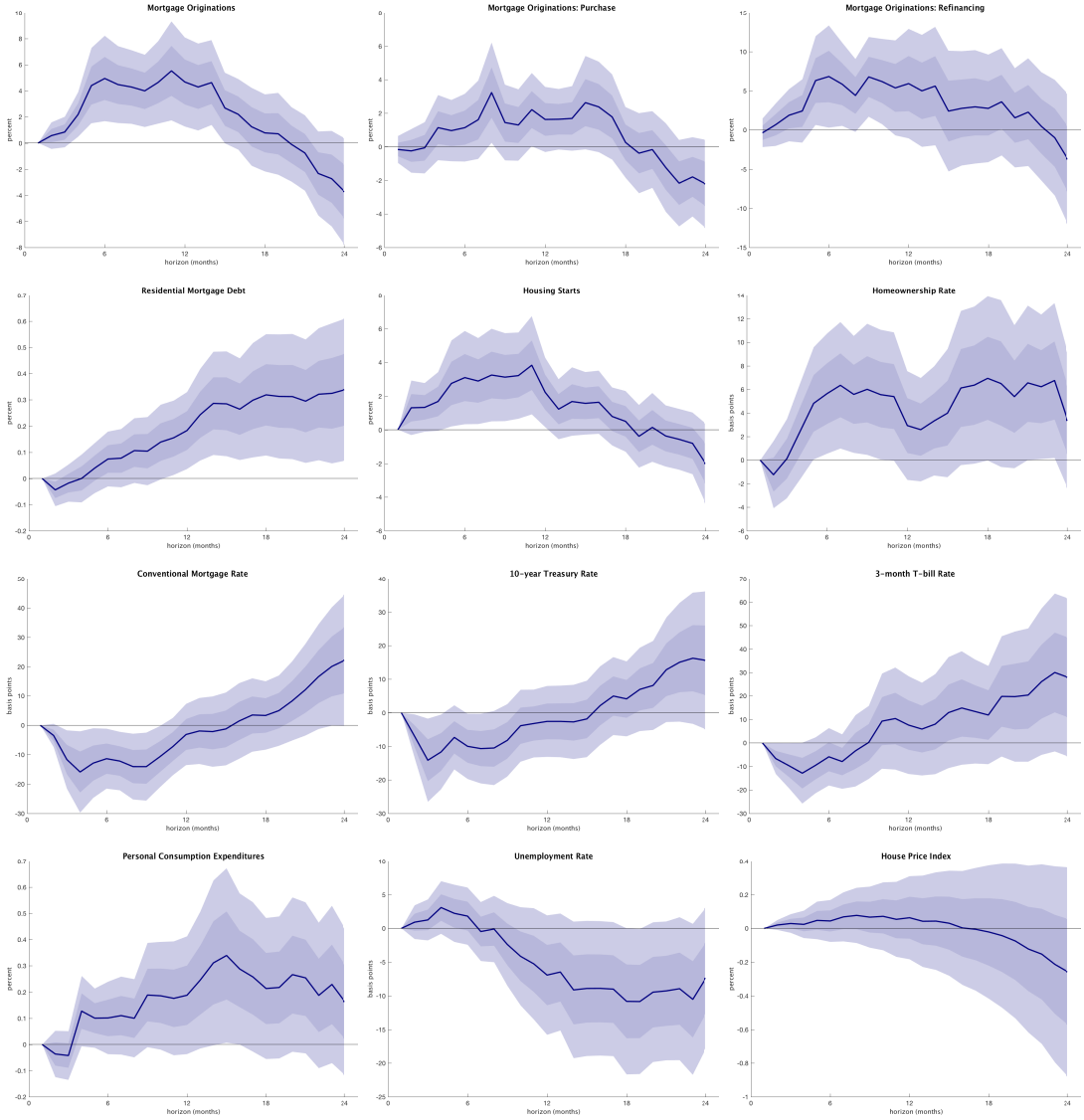

Figure A.3. Shock to Anticipated Agency Purchases: Responses Using GSE Excess Returns Instrument

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the GSE excess stock returns innovations, see equation (A.2). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

The first row in Figure A.3 shows statistically significant increases in mort-

gage originations following a shock to agency purchases. The rise in total originations occurs slightly more rapidly, and is more transitory than with the narrative instrument. The peak increase in originations is, on the other hand, very similar in size to that in Figure 1.7, and occurs between 10 and 14 months at around 4 percent. As with the narrative instrument, both home purchase and refinancing originations rise, but the rise in refinancing activity is particularly pronounced. The leftmost panel in the second row shows that the rise in the stock of mortgage debt is also very similar to that in Figure 1.7. As in our benchmark results, agency purchases lead to a statistically significant rise in housing starts, which are around 2 percent higher between 4 and 12 months after the shock. There is also a significant and persistent rise in homeownership. The third row in Figure A.3 shows that the conventional mortgage rate is lower by 10 to 15 basis points after 6 to 18 months. The declines in the 10-year and 3-month Treasury rates are also similar to our benchmark results.

The bottom row in Figure A.3 reveals some differences with our benchmark narrative instrument. The left panel shows a more pronounced increase in consumer spending following the GSE excess returns shock, as well as a clear decline in the unemployment rate. The responses of consumption, unemployment, and personal income (not displayed) are even marginally statistically significant. In contrast to Figure 1.10, there is, on the other hand, no indication that house price are affected significantly by agency purchases.

The results produced by this alternative identification strategy are also similar for other variables not shown in Figure A.3. The GSE excess returns instrument, for instance, also yields a temporary decline in the federal funds rate, although it is smaller in size and not statistically significant. We note, on the

other hand, that the GSE excess returns instrument does not yield a similar significant decline in the Romer and Romer (2004) residual, and also leads to different conclusions regarding the role of traditional interest rate policies. Figure A.4 compares the estimated responses to those under the counterfactual with constant short-term interest rates, as in Figure 1.13. In contrast to the findings based on the narrative instrument, the drop in long-term interest rates remains clearly present after holding short-term interest rates fixed when we use GSE excess returns shocks for identification. The same is true for the positive effect on housing starts and, to a lesser extent, for the rise in mortgage debt. As in Figure 1.13, purchases of mortgage assets continue to have statistically significant effects on mortgage lending, and short-term interest rates appear irrelevant for the effect on homeownership.

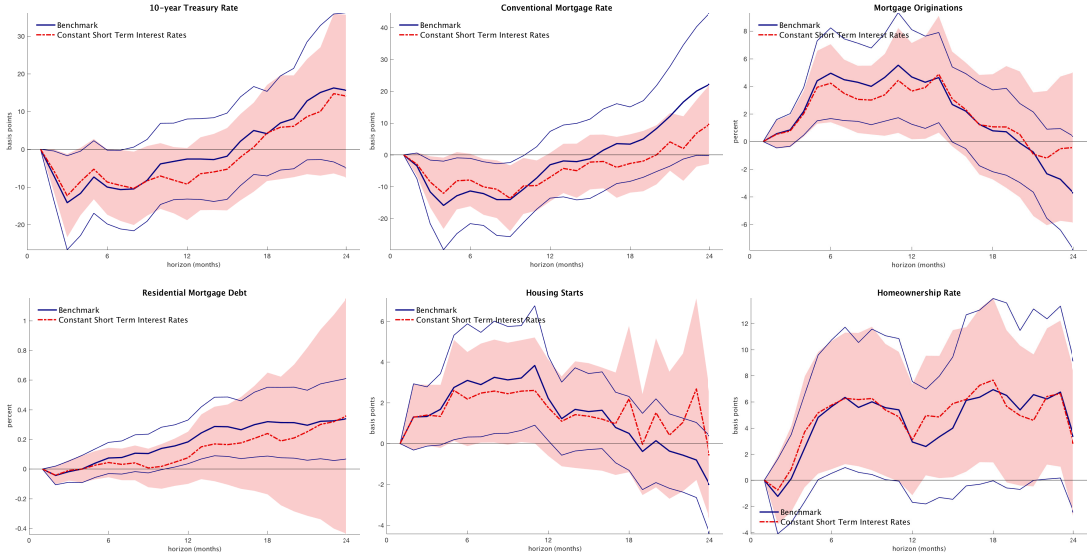

Figure A.4. Counterfactual with Constant Short-Term Rate Using GSE Excess Returns Instrument

Notes: The figure shows responses to a one pp. increase in the expected future agency market share and a sequence of monetary shocks such that the 3-month T-bill rate remains constant. Estimates are from local projections-IV regressions instrumenting agency commitments with the GSE excess stock returns shocks and the 3-month T-bill rate with the Romer and Romer (2004) monetary policy shock measure. Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

Appendix A3: Data Sources and Construction

Data underlying Figure 1.1: *Residential Mortgage Debt* post-1945 is the sum of home mortgages and multifamily residential mortgages from the Federal Reserve's Financial Accounts of the United States. Pre-1945 data is spliced using Series N-151 (Nonfarm Residential Mortgage Debt) from the Historical Statistics of the United States (1960 edition). *Nominal GDP* post-1929 is from the National Income and Product Accounts, spliced using series Ca-10 from the Historical Statistics of the United States (Table Ca9-19, Millennial Edition). The data for *Housing Wealth* post-1930 is from Davis and Heathcoate (2007) available at and updated by the Lincoln Institute of Land Policy, `http://www.lincolninst.edu/research-data/data`. Pre-1930 data is spliced using Series N-129 (Total Nonfarm Residential Wealth) from the Historical Statistics of the United States (1960 edition).

Agency Mortgage Holdings is the sum of the retained mortgage portfolios of Fannie Mae, Freddie Mac, Ginnie Mae, the FHLBanks, the Treasury Department, the Federal Reserve, and a number of other government agencies. Both holdings of whole loans and mortgage pools are included.

> Fannie Mae: Monthly data on Fannie's retained mortgage portfolio from 1950 to 2003 is from various issues of the Federal Reserve Bulletin, which stopped reporting GSE portfolio statistics in 2003. From then onwards, the data is from Fannie's monthly volume summary cross-checked with the annual reports from OFHEO/FHFA for consistency. Prior to 1950, the data is based on fiscal year data from a Fannie publication titled "*FNMA Background and History*" (1969 and 1973 editions), as well as Series N-159

from the Historical Statistics of the United States (1960 edition).

Freddie Mac: Monthly data on Freddie's retained mortgage portfolio from 1970 to 2003 is from various issues of the Federal Reserve Bulletin, and after 2003 from Freddie's monthly volume summary cross-checked with the annual reports from OFHEO/FHFA for consistency.

Ginnie Mae: Quarterly data on Ginnie's home and multifamily mortgage from the Financial Accounts of the United States. Monthly data is available from 1968 to 1974 from various issues of the Federal Reserve Bulletin.

FHLBanks: Data on FHLB mortgage holdings is from various issues of FHFA annual reports (annual from 1992 to 2007 and quarterly since 2008). Pre-1992 annual data is from a 1993 CBO study titled "*The Federal Home Loan Banks in the Housing Finance System*" (p. 15).

Treasury: Data from the Treasury Department `https://www.treasury.gov/resource-center/data-chart-center/Pages/mbs-purchase-program.aspx`

Federal Reserve: Data from the Federal Reserve's Financial Accounts of the United States.

Other Agencies: The home and multifamily holdings of the Veterans Administration, the Federal Housing Administration, the Federal Farmers Home Administration, the Resolution Trust Corporation, the Federal Deposit Insurance Corporation, and Public Housing Administration are all obtained from the Financial Accounts of the United States. Data from the Home Owners' Loan Corporation (which in the Financial Accounts is included with Fannie Mae) is series N-158 from the Historical Statistics of the United States (1960 edition).

The upper left panel of Figure 1.1 shows annual data up to 1952 and quarterly data afterwards. Missing quarterly data on FHLB holdings is obtained by linear interpolation of annual data.

Residential mortgage originations shown in the lower left panel of Figure 1.1 is the quarterly aggregate of the monthly series described below.

Agency Net Portfolio Purchases and Pool Issues is the sum of net portfolios purchases of both whole loans as well as mortgage pools, and of issues of mortgage pools respectively, by Fannie Mae, Freddie Mac, Ginnie Mae, the FHLBanks, the Treasury Department, the Federal Reserve, and a number of other government agencies:

> Fannie Mae: Monthly data on Fannie's net portfolio purchases from 1953 to 1998 is from various issues of the Federal Reserve Bulletin (portfolio purchases less sales). More recent data is from Fannie's monthly volume summary cross-checked with the annual reports from OFHEO/FHFA for consistency. While data on purchases is available over the entire sample, data on portfolio sales is missing for 1986 and 1988-1997. We impute the missing observations using data on Fannie's commitments to purchase and sell, actual purchases, and the net change in the retained portfolio. The imputation is done by Kalman smoothing in a state space model estimated by maximum likelihood as in Shumway and Stoffer (1982) using monthly data from 1980 to 2014. The model used is a vector autoregressive process for the net portfolio purchase rate, retained mortgage portfolio growth, and the ratio of purchases and net commitments to the retained portfolio. Data on Fannie pool issues from 1993 is from Lehnert, Passmore, and Sherlund (2008), extended to 2014 using Fannie's monthly vol-

ume summaries. Pre-1993 monthly data is obtained by subtracting Freddie and Ginnie pool issues from total net purchases by agency mortgage pools from monthly releases by the Department of Housing and Urban Development from the Survey of Mortgage Lending Activity (obtained through the National Archives and Records Administration).

Freddie Mac: Monthly data on Freddie's net portfolio purchases from 1993 onwards is from Lehnert, Passmore, and Sherlund (2008) and Freddie's monthly volume summaries. Data before 1984 is obtained by subtracting Freddie pool issues from total wholesale loan purchases available from the Federal Reserve Bulletin. Data between 1984 and 1993 is imputed using data on Freddie holdings and repayment rates in Fannie's portfolio. The imputation is done by Kalman smoothing in a state space model estimated by maximum likelihood as in Shumway and Stoffer (1982) using monthly data from 1980 to 2014. The model used is a vector autoregressive process for Freddie's net portfolio purchase rate, retained mortgage portfolio growth, and repayment rates in Fannie's retained portfolio. Monthly data on Freddie pool issuance is from the journal of the Federal Home Loan Bank Board (various issues, 1971-1980), the Federal Reserve Bulletin (1980-1998), and the monthly volume summaries (1998 onwards).

Ginnie Mae: Monthly data on Ginnie's net portfolio purchases from 1968 to 1971 is from various issues of the Federal Reserve Bulletin. Subsequent data is imputed by assuming that repayment rates for mortgages packaged in pools backed by Ginnie are the same as for mortgages held in portfolio. Monthly data on Ginnie pool issues since 1968 was provided to us directly by the Department of Housing and Urban Development.

FHLBanks: Data on net purchases by the FHLBanks is imputed using

net changes in holdings and assuming that the combined repayment rate on mortgage debt in Fannie, Freddie and Ginnie pools is identical to the repayment rate on mortgages in mortgage-backed securities held by the FHLBanks.

Treasury: Data on MBS purchases is from the Treasury Department `https://www.treasury.gov/resource-center/data-chart-center/Pages/mbs-purchase-program.aspx`.

Federal Reserve: Data on MBS purchases using the date of settlement is available from the Board of Governors `https://www.federalreserve.gov/newsevents/reform_mbs.htm` and the Federal Reserve Bank of New York `https://www.newyorkfed.org/markets/ambs/ambs_schedule.html`.

Other Agencies: Data on combined net purchases by the other agencies is imputed using net changes in holdings and by assuming that the combined repayment rate on mortgages debt in Ginnie pools is identical to the repayment rate on mortgages in mortgage-backed securities held in portfolio.

The lower right panel of Figure 1.1 shows quarterly data from 1952 onwards.

Data underlying Figure 1.2: *Agency mortgage holdings* is the quarterly series from Figure 1.1. *Private mortgage holdings* is total residential mortgage debt from Figure 1.1 less agency holdings. Both series are deflated by the price index for personal consumption expenditures excluding food and energy from NIPA (series PCEPILFE from the FRED database at the Federal Reserve Bank of St. Louis). The chronology for pre-1986 credit crunches is from Eckstein and

Sinai (1986). The dating of post-1986 crunches is based on Owens and Schreft (1993) for the 1990 commercial real estate crunch, Lehnert, Passmore, and Sherlund (2008) for the 1998 Russian default/LTCM crisis, and Bordo and Haubrich (2010) for the 2007 financial crisis.

Monthly agency data: The monthly series for *consolidated agency mortgage holdings* and *net portfolio purchases* sums the monthly series for Fannie, Freddie, Ginnie, the Federal Reserve, and the Treasury described above (see data underlying Figure 1.1). All series are seasonally adjusted using the X-13 program from the Census Bureau.

Agency purchase commitments are the sum of the following series:

Fannie Mae: Monthly data on the stock of total outstanding unfulfilled commitments from 1953 to 1990 is available from various issues of the Federal Reserve Bulletin. To obtain net purchase commitments made during the month, we add net purchases to the net change in commitments outstanding. From 1990 onwards we use net commitments (issued less to sell) from the Federal Reserve Bulletin (up to 2003) and Fannie's monthly volume summaries (2003 onwards).

Freddie Mac: Monthly data on Freddie's net portfolio commitments (issued less to sell) is from Freddie's monthly volume summaries from 1998 onwards. For observations before 1998, we use Freddie net portfolio purchases.

Federal Reserve: Data on MBS purchases using the trade date is available from the Board of Governors `https://www.federalreserve.gov/newsevents/reform_mbs.html` and the Federal Reserve Bank of New

York.

No data for net commitments is available for Ginnie Mae and the Treasury, and we simply use the series for net portfolio purchases.

Monthly mortgage market data: The *conventional mortgage rate* is the 30-year fixed-rate conventional conforming mortgage rate. From 1971 onwards, the conventional rate is the monthly average commitment rate from the Freddie Mac primary mortgage market survey. Pre-1971 data is from the Federal Housing Administration (FHA)/Department of Housing and Urban Development (HUD) series for the primary conventional market rate, available from the Federal Reserve Bulletin (various issues). The *FHA mortgage rate* is the 30-year fixed-rate FHA-guaranteed mortgage rate. Rate data for FHA-mortgages offered in the secondary market from 1963 is provided by FHA/HUD and is available from various issues of the Federal Reserve Bulletin. Earlier data is from the NBER's macrohistory database (series m13045). The series has a handful of missing observations and was discontinued in 2000. We impute data by Kalman smoothing in a VAR/state space model estimated by maximum likelihood as in Shumway and Stoffer (1982) using several closely related interest rate series over the 1976-2014 period: the conventional 30-year rate (FHA/HUD as well as the Freddie Mac series), the 3-month and 10-year Treasury rates, and yields on Ginnie Mae securities (from the Federal Reserve Bulletin as well as the MTGEGNSF Index from Bloomberg). A couple of missing observations prior to 1976 were imputed in a similar fashion using data on the 3-month and 10-year Treasury rates, on interest rate data provided by Saul B. Klaman's 1961 NBER publication "The Postwar Residential Mortgage Market", and on interest rate ceilings on FHA loans applicable at the time. The 10-year and 3-month Trea-

sury rates are from the FRED database (GS10 and TB3MS).

The primary source of monthly data on *residential mortgage originations* are monthly news releases from the Survey of Mortgage Lending Activity (SMLA) conducted by HUD from 1970 to 1997, accessed through the National Archives and Records Administration (Tables 2 and 3: total originations of long-term mortgage loans for 1-to-4 nonfarm homes and multifamily residential properties). The monthly series is interpolated after 1997 using quarterly data on originations (series USMORTORA in Datastream) and weekly data on mortgage applications (series MBAVBASC on Bloomberg), both from the Mortgage Bankers' Association (MBA). The interpolation is done through Kalman smoothing of an estimated VAR/state space model as in Shumway and Stoffer (1982). Observations before 1965 are based on data of total new non-farm mortgages of $20,000 or less recorded from the Federal Home Loan Bank Board and available from the NBER's macrohistory database (series m02173). To obtain an estimate of total originations, we assume that the share of originations of $20,000 or less in all originations is the same as the share in originations by Savings & Loans associations. Data on S&L originations (total and $20,000 or less) is available from various issues of the Savings and Home Financing Sourcebooks, a publication by the Federal Home Loan Bank Board up prior to 1990. Data between 1965 and 1970 is imputed using total originations by S&L associations based on Kalman smoothing in a VAR/state space model estimated as in Shumway and Stoffer (1982) using monthly data from 1954 to 1985. The series is seasonally adjusted using the X-13 program from the Census Bureau.

Unfortunately, the monthly SMLA releases do not contain information on the purpose of the mortgage loans. However, the Savings and Home Financing Sourcebooks published prior to 1990 contain monthly data on refinancing origi-

nations by S&L banks (although observations from May 1985 to December 1986 are missing). After 1990, quarterly totals of refinancing originations are available from the MBA (series USMORRVLA in Datastream). As an estimate of the share of refinancing loans, we use the monthly shares at S&L banks before 1990, and the quarterly shares from the MBA afterwards. Our monthly series on *refinance* and *purchase originations* are obtained by applying the estimated share of refinancing to our series for total residential mortgage originations.

The monthly series for *mortgage debt* is based on interpolation of the quarterly mortgage debt series from the Financial Accounts of the United States (see Figure 1.1) using the series on monthly originations. The series is constructed by linear interpolation of the implied quarterly repayment rates. The final series is seasonally adjusted using the X-13 program from the Census Bureau.

Other monthly variables The series on (seasonally adjusted) *housing starts* is from the Census Bureau and obtained through the FRED database at the Federal Reserve Bank of St. Louis (series HOUST). *House prices* post-1975 are measured by the Freddie Mac house price index (FMHPI) available at `http://www.freddiemac.com/finance/house_price_index.html`. The data are extended before 1975 by splicing with the home purchase component of the BLS Consumer Price Index (PHCPI from FRED), obtained from Shiller (2015), and seasonally adjusted using the X-13 program from the Census Bureau. The series is deflated by the *nominal price level*, measured by the core PCE price index to obtain a real house price index (series PCEPILFE from FRED). To the best of our knowledge, no monthly data on the *homeownership rate* is available. We therefore simply use quarterly values of series RHORUSQ156N from FRED. Monthly *personal consumption expenditures* is from NIPA (series PCE from FRED). Monthly

personal income is from NIPA (series PI from FRED). The *unemployment rate* is series UNR from FRED. The *short- and long-term nominal interest rate*s 3-month and 10-year Treasury rates are series TB3MS and GS10 from FRED. The *BAA and AAA corporate bond rates* are the Moody's seasoned BAA and AAA yields (series BAA and AAA from FRED).

Appendix IV: Additional Results and Robustness Checks

Cumulative Credit Multipliers

This section discusses a number of robustness checks of the results presented in Section 1.5 regarding the cumulative effects of agency purchases.

1. Scaling by Trend Originations. The baseline specification in (1.2) uses a trend in personal income as the scaling variable. Figure A.5 reports the results when we instead use a long-run trend in annualized mortgage originations. The latter is obtained by fitting a third degree polynomial of time to the log of real mortgage originations obtained using the core PCE price index as the deflator. This is potentially consequential for the results because of trend growth of the mortgage market relative to the economy. However, the figure shows that the results remain generally similar to the baseline in Figure 1.5. Cumulative originations do not increase in the short run, but are higher by 4 dollars after 3 to 4 years, while mortgage debt rises in the long run by almost one dollar. The bulk of the new originations are for refinance purposes, while originations for home purchases are higher by 1 to 1.5 dollars after 3 to 4 years.

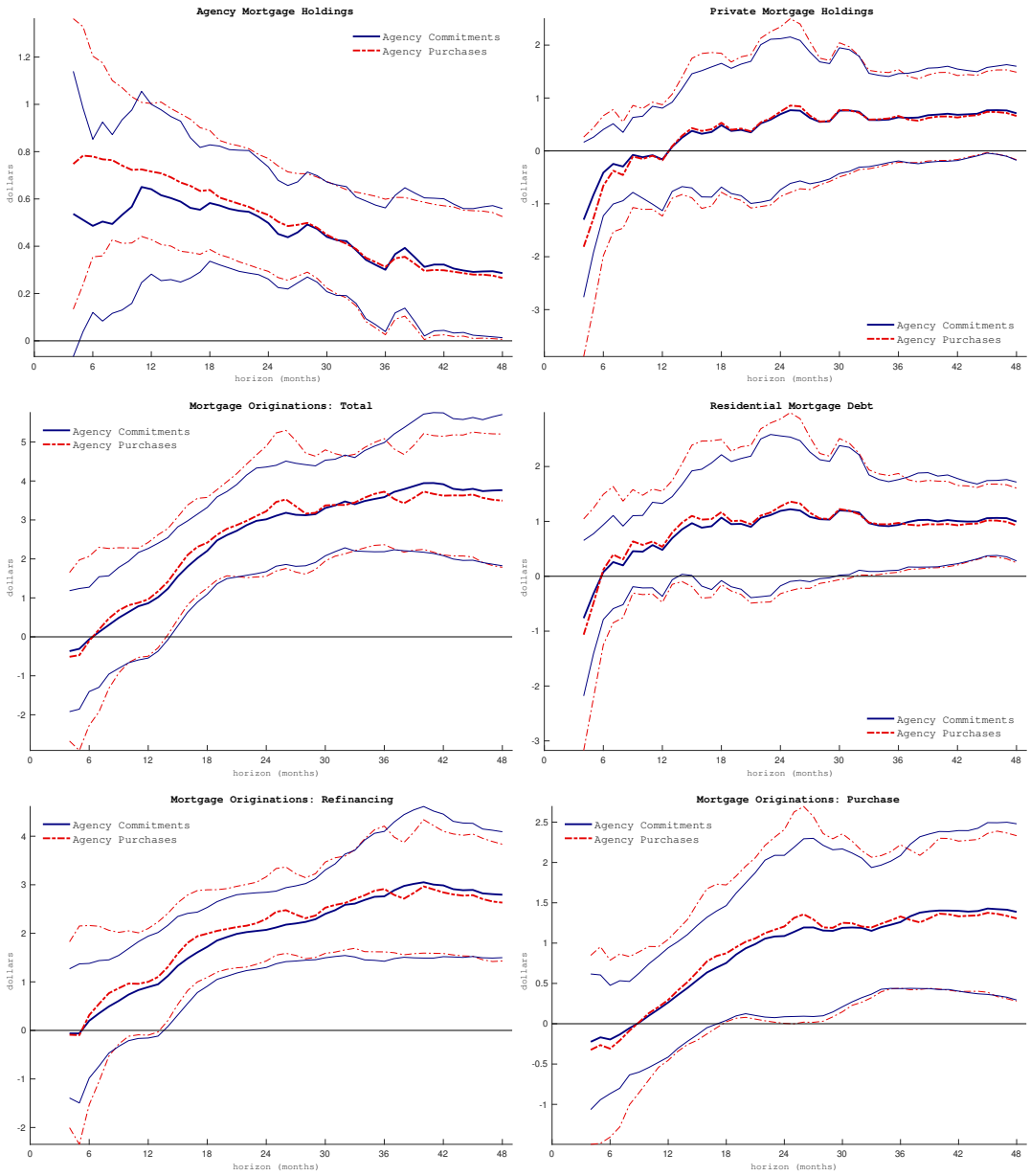

Figure A.5. Cumulative Estimates Using Trend Originations as the Scaling Variable

Notes: The figure shows dollar changes per dollar increase in agency net portfolio purchases or commitments to purchase cumulated over the reported horizon in months. Estimates are from local projections-IV regressions, see equation (1.2). Finer lines are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006. In the bottom row panels, the sample excludes May 1985 to Dec 1986 because of missing data on refinance shares.

2. Agency Pool Issuance. Figure A.6 reports the cumulative dollar change in agency issuance of mortgage pools, i.e. MBS. In contrast to originations or total

mortgage debt, the choice of scaling variable is important for the cumulative impact on agency MBS issuance. Scaling by trend income implicitly assigns a larger relative weight to policy changes that occur later in the sample. The left panel of Figure A.6 shows that at relatively short horizons, agency MBS issuance rises by roughly the same dollar amount as the increase in agency mortgage holdings, see Figure 1.5. The fact that private mortgage holdings also decrease by roughly the same amount implies that the agency portfolio purchases are predominantly of MBS, while there are no additional MBS sales to private investors. As the horizon increases, cumulative MBS issuance rises to close to 2 dollars after three to four years. The increase in MBS issuance coincides closely with the rise in originations. Cumulative MBS issuance converges to around 40% to 50% of the cumulative rise in originations, which is about the typical agency securitization share since the mid-1980s. The right panel of Figure A.6 shows in contrast no short-run impact on MBS issuance when the scaling variable is a trend in originations, implying that the agency portfolio purchases are instead of whole loans. MBS issuance gradually rises, but the total cumulative increase is a smaller share of the total increase in originations. This pattern is more similar to agency behavior before the growth of mortgage securitization in the mid-1980s.

3. Other Robustness Checks. Table A.1 clarifies how the results depend on instrumentation and the choice of controls. Estimates from the benchmark specifications of Section 1.5 using net commitments and purchases are reported in columns [6] and [7], respectively. Given the similarity of the results, the other columns all report multipliers associated with commitments only. To assess the role of instrumentation, column [5] reports the OLS estimates for the benchmark specification. Columns [3] to [4] display the OLS and IV estimates when the

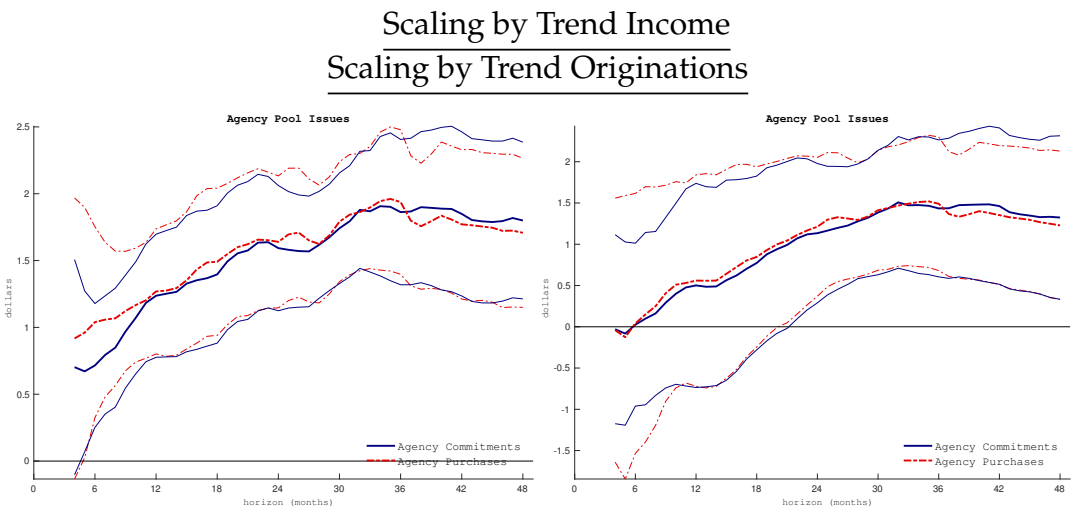

Figure A.6. Total Mortgage Pool Issuance Associated with Agency Mortgage Purchases

Notes: The figure shows dollar changes per dollar increase in agency net portfolio purchases or commitments to purchase cumulated over the reported horizon in months. Estimates are from local projections-IV regressions, see equation (1.2), using non-cyclical policy events as the instrument. Finer lines are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

cyclical indicators (unemployment and income growth) are omitted. Columns [1] and [2] further omit the interest rate controls. Finally, column [8] shows the IV estimates when we use all policy events, both cyclical and non-cyclical, to construct the instrument. To better visualize the role of instrumentation by the narrative instrument, Figure A.7 displays the cumulative effects on agency holdings and mortgage originations estimated by OLS and 2SLS for all horizons.

We highlight the following patterns from the results in Table A.1. First, the point estimates across the IV regressions are all quite similar. Controlling for interest rates is the most consequential. When leaving out interest rates in [2], we find somewhat smaller increases in mortgage originations and debt. The results are essentially unchanged by including the cyclical controls (unemployment and income growth). Interestingly, and conditional on including the richest control set as in our benchmark specification, the results remain similar when

Table A.1: OLS and IV Estimates of Balance Sheet Adjustments and Mortgage Credit Multipliers

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Agency Holdings	12	0.35***	0.61***	0.33***	0.68***	0.35***	0.66***	0.68***	0.56***
		(0.19,0.50)	(0.35,0.88)	(0.18,0.48)	(0.43,0.93)	(0.21,0.49)	(0.40,0.92)	(0.44,0.91)	(0.25,0.87)
	18	0.37***	0.55***	0.33***	0.58***	0.35***	0.54***	0.57***	0.42***
		(0.25,0.49)	(0.33,0.78)	(0.22,0.44)	(0.35,0.81)	(0.26,0.45)	(0.30,0.77)	(0.34,0.80)	(0.15,0.70)
	24	0.37***	0.50***	0.31***	0.51***	0.33***	0.47***	0.49***	0.37***
		(0.26,0.48)	(0.29,0.71)	(0.20,0.42)	(0.29,0.73)	(0.23,0.43)	(0.26,0.69)	(0.27,0.70)	(0.12,0.63)
	36	0.36***	0.26**	0.28***	0.26**	0.29***	0.23*	0.24*	0.15
		(0.27,0.46)	(0.01,0.51)	(0.18,0.38)	(0.01,0.50)	(0.20,0.38)	(−0.00,0.47)	(−0.01,0.50)	(−0.15,0.44)
	48	0.35***	0.25**	0.26***	0.23*	0.27***	0.22*	0.21*	0.19
		(0.25,0.44)	(0.00,0.49)	(0.16,0.36)	(−0.03,0.49)	(0.18,0.36)	(−0.04,0.47)	(−0.03,0.45)	(−0.08,0.46)
Private Holdings	12	−0.16	−0.76**	−0.12	−0.81**	−0.11	−0.75**	−0.77**	−0.68*
		(−0.47,0.15)	(−1.36,−0.15)	(−0.40,0.15)	(−1.43,−0.19)	(−0.38,0.17)	(−1.40,−0.11)	(−1.39,−0.15)	(−1.49,0.13)
	18	−0.17	−0.43	−0.07	−0.31	−0.07	−0.23	−0.25	0.01
		(−0.41,0.06)	(−1.01,0.15)	(−0.29,0.14)	(−0.94,0.31)	(−0.28,0.14)	(−0.81,0.34)	(−0.86,0.36)	(−0.70,0.73)
	24	−0.12	−0.26	0.06	−0.11	0.06	−0.07	−0.07	0.20
		(−0.35,0.10)	(−0.85,0.34)	(−0.15,0.26)	(−0.73,0.50)	(−0.14,0.25)	(−0.63,0.48)	(−0.64,0.49)	(−0.52,0.93)
	36	−0.03	0.14	0.27***	0.34	0.30***	0.30	0.31	0.55
		(−0.29,0.22)	(−0.73,1.01)	(0.09,0.45)	(−0.32,0.99)	(0.11,0.49)	(−0.27,0.88)	(−0.28,0.91)	(−0.17,1.27)
	48	0.19	0.67	0.55***	0.90*	0.57***	0.82*	0.78*	0.84
		(−0.12,0.51)	(−0.63,1.97)	(0.32,0.78)	(−0.14,1.94)	(0.33,0.81)	(−0.13,1.76)	(−0.13,1.68)	(−0.18,1.87)
Mortgage Debt	12	0.18**	−0.14	0.21***	−0.14	0.24***	−0.09	−0.10	−0.12
		(0.02,0.35)	(−0.54,0.26)	(0.06,0.36)	(−0.56,0.29)	(0.09,0.40)	(−0.53,0.34)	(−0.54,0.34)	(−0.70,0.46)
	18	0.20***	0.12	0.26***	0.27	0.29***	0.30	0.32	0.44
		(0.06,0.34)	(−0.31,0.56)	(0.12,0.40)	(−0.21,0.74)	(0.14,0.43)	(−0.11,0.72)	(−0.13,0.77)	(−0.10,0.97)
	24	0.25***	0.24	0.37***	0.40*	0.39***	0.40*	0.41*	0.58**
		(0.10,0.39)	(−0.23,0.71)	(0.23,0.50)	(−0.08,0.88)	(0.25,0.53)	(−0.01,0.81)	(−0.02,0.84)	(0.02,1.13)
	36	0.33***	0.40	0.55***	0.59**	0.59***	0.54**	0.56***	0.70***
		(0.15,0.51)	(−0.27,1.08)	(0.43,0.68)	(0.12,1.07)	(0.46,0.73)	(0.13,0.95)	(0.14,0.98)	(0.18,1.21)
	48	0.54***	0.92*	0.81***	1.13***	0.84***	1.03***	0.98***	1.03**
		(0.30,0.78)	(−0.16,1.99)	(0.65,0.98)	(0.31,1.95)	(0.67,1.01)	(0.31,1.76)	(0.29,1.68)	(0.24,1.83)
Originations	12	2.24***	1.33***	2.43***	1.22***	2.37***	1.32***	1.35***	1.45***
		(1.69,2.79)	(0.42,2.24)	(1.99,2.86)	(0.37,2.07)	(1.94,2.80)	(0.44,2.20)	(0.40,2.31)	(0.41,2.50)
	18	2.47***	1.87***	2.80***	2.00***	2.72***	2.14***	2.29***	2.50***
		(1.99,2.94)	(0.99,2.74)	(2.47,3.14)	(1.14,2.85)	(2.38,3.06)	(1.32,2.96)	(1.37,3.20)	(1.55,3.45)
	24	2.48***	2.03***	2.93***	2.37***	2.83***	2.52***	2.59***	2.94***
		(2.06,2.90)	(1.17,2.89)	(2.58,3.27)	(1.49,3.26)	(2.49,3.18)	(1.68,3.35)	(1.67,3.51)	(1.92,3.97)
	36	2.46***	2.83***	3.14***	3.38***	3.13***	3.40***	3.54***	3.62***
		(1.98,2.94)	(1.39,4.28)	(2.68,3.61)	(2.00,4.77)	(2.63,3.62)	(2.10,4.71)	(2.25,4.83)	(2.15,5.10)
	48	2.56***	3.38***	3.25***	4.02***	3.23***	3.96***	3.76***	3.92***
		(2.05,3.07)	(1.34,5.41)	(2.65,3.84)	(2.13,5.90)	(2.64,3.83)	(2.20,5.72)	(2.09,5.43)	(2.02,5.82)
Dollar increase in:		Comm.	Comm.	Comm.	Comm.	Comm.	Comm.	Purch.	Comm.
Method:		OLS	2SLS-NC	OLS	2SLS-NC	OLS	2SLS-NC	2SLS-NC	2SLS-ALL
Interest rate controls:		No	No	Yes	Yes	Yes	Yes	Yes	Yes
Cyclical controls:		No	No	No	No	Yes	Yes	Yes	Yes

Notes: Numbers are dollar amounts. Estimates are from local projections-IV regressions, see equation (1.2). OLS: no instrument used; 2SLS-NC, instrument based on non-cyclical policy events; 2SLS-ALL: instrument based on all policy events. 95% Newey and West (1987) confidence bands in parentheses. Asterisks denote 10%, 5%, or 1% significance. Sample: Jan 1967 to Dec 2006.

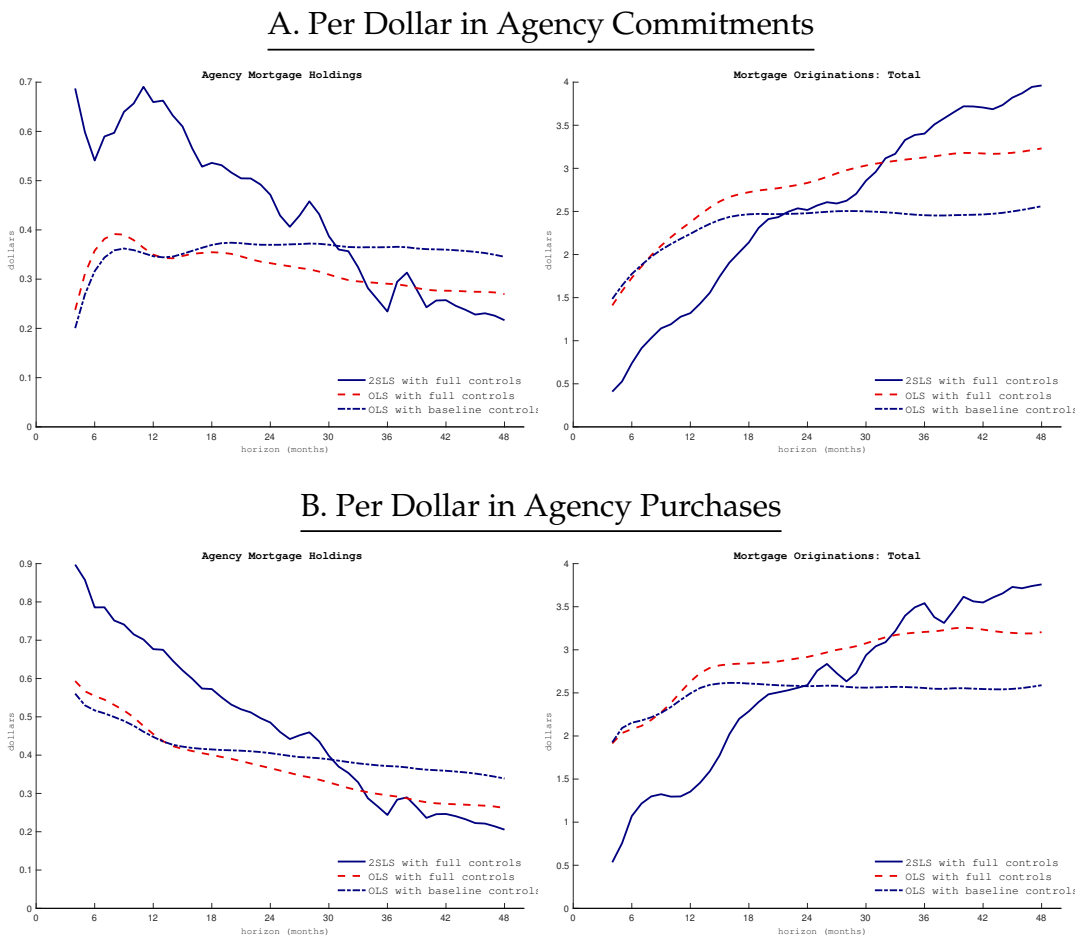

Figure A.7. Comparing OLS and 2SLS Estimates of Mortgage Credit Multipliers

Notes: The figure shows dollar changes per dollar increase in agency net portfolio purchases or commitments to purchase cumulated over the reported horizon in months. The specification with baseline controls excludes the interest rate and cyclical controls.

we also include the cyclically motivated policy events in the instrument, see column [8]. This suggest that any bias arising because the cyclical policy events are correlated with other economic shocks is probably relatively small compared to the other sources of endogeneity bias discussed in Section 1.4.1. Another factor that may mitigate the impact of the cyclical policy events are the lagged controls. Based on our reading of the various historical policy actions, see Fieldhouse and Mertens (2017), recognition and decision lags likely exceed one month in practice. With a sufficiently rich set of lagged controls, including the cyclical actions

may therefore not lead to any meaningful violation of the requirement that the policy events are contemporaneously uncorrelated with economic shocks.

Instrumentation with policy events, however, is important for the results. The OLS estimates in columns [1], [3], and [5] differ substantially in size and display very different time patterns from the IV counterparts in columns [2], [4], and [6]: Agency holdings rise immediately and more or less independently of the horizon, private holdings do not fall significantly over shorter horizons, and originations are higher by an amount that is much less dependent on the horizon. The OLS estimates are likely contaminated by reverse causality, as this pattern is more consistent with private lenders simply passing on newly originated loans to the agencies rather than selling existing loans off their balance sheets. Figure A.7 further illustrates this by depicting the full set of OLS and 2SLS estimates for agency holdings and mortgage originations. Regardless of whether the baseline or full set of controls are included, the bulk of the increase in mortgage originations per dollar change in commitments occurs within the first 12 months (panel A), and within even a much shorter window when the regressor is agency purchases (panel B). Such a pattern indicates a much stronger contemporaneous relation between originations and agency purchases. Given decision lags as well as the time delays associated with the making of new mortgage loans, the delayed and gradual rise in originations that appears after instrumentation is more consistent with a causal interpretation. Figure A.7 also reveals that the total agency mortgage holdings increase by a substantially smaller amount than the dollar purchased or committed, even at relative short horizons. This indicates that agency purchases tend to coincide with higher sales of mortgage assets to private investors and/or with higher repayment rates, both of which are likely to reflect other influences on the private demand for mortgage

credit in the primary or secondary market.

Table A.2 verifies the robustness of the results to variations in the sample and to the inclusion of additional indicators of agency activity. For comparison, column [1] repeats the benchmark estimates based on net commitments. For brevity, all other columns are based on using commitments as the measure of agency purchasing activity. Column [2] extends the end point of the sample from December 2006 to December 2014. Note that in this case the h-th regression in (1.2) drops the last h observations. Column [3] restricts the sample by setting September 1982 as the starting point, marking the end of the period of non-borrowed reserves targeting by the Federal Reserve. This shorter sample selects a period of more stable monetary policy. Because of the smaller sample, we omit in this case the cyclical controls to reduce the number parameters to be estimated. Columns [4], [5], and [6] show results when we omit in turn each of the three largest policy interventions from the non-cyclical narrative instrument: the October 1977 conforming loan limit increase and expansion of the Brooke-Cranston Tandem program, the December 1982 increase in Fannie Mae's debt-to-capital limit, and the September 2004 tightening of capital requirements. In each case we add the omitted event as a separate dummy variable, including both the contemporaneous value and twelve lags to the control variables. The final two columns include lagged values of two indicators of agency activity as additional controls: the volume of mortgage pool issues (in ratio of X_t) and log ratio of GSE stock prices to the S&P 500 index. In the latter case, the sample starts in September 1971 instead of December 1967, reflecting the fact that Fannie Mae stock started trading on August 31, 1970.

Table A.2: Credit Multipliers, Sample and Robustness Checks

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Agency Holdings	12	0.66***	0.76***	0.42***	0.88	0.64***	0.67***	0.72***	0.63***
		(0.40, 0.92)	(0.31, 1.22)	(0.23, 0.61)	(−0.35, 2.11)	(0.38, 0.90)	(0.38, 0.96)	(0.40, 1.04)	(0.32, 0.94)
	18	0.54***	0.62***	0.31***	0.78	0.52***	0.53***	0.60***	0.48***
		(0.30, 0.77)	(0.27, 0.96)	(0.16, 0.45)	(−0.18, 1.75)	(0.29, 0.75)	(0.27, 0.78)	(0.29, 0.90)	(0.12, 0.85)
	24	0.47***	0.55***	0.26***	0.59	0.45***	0.47***	0.53***	0.43**
		(0.26, 0.69)	(0.28, 0.82)	(0.12, 0.41)	(−0.16, 1.35)	(0.23, 0.67)	(0.24, 0.69)	(0.25, 0.82)	(0.04, 0.81)
	36	0.23*	0.32***	0.08	0.32	0.21	0.16	0.21	0.27
		(−0.00, 0.47)	(0.11, 0.53)	(−0.10, 0.25)	(−0.19, 0.83)	(−0.04, 0.45)	(−0.11, 0.43)	(−0.09, 0.52)	(−0.13, 0.66)
	48	0.22*	0.19	0.09	0.17	0.20	0.15	0.20	0.30
		(−0.04, 0.47)	(−0.10, 0.47)	(−0.12, 0.30)	(−0.82, 1.16)	(−0.07, 0.46)	(−0.15, 0.44)	(−0.14, 0.54)	(−0.08, 0.68)
Private Holdings	12	−0.75**	−1.23**	−0.44*	−0.83	−0.72**	−0.83**	−0.94**	−0.95***
		(−1.40, −0.11)	(−2.20, −0.27)	(−0.93, 0.04)	(−3.34, 1.68)	(−1.36, −0.07)	(−1.58, −0.08)	(−1.70, −0.18)	(−1.67, −0.23)
	18	−0.23	−0.68*	0.01	0.31	−0.21	−0.32	−0.31	−0.30
		(−0.81, 0.34)	(−1.40, 0.04)	(−0.28, 0.31)	(−2.22, 2.83)	(−0.81, 0.39)	(−0.94, 0.29)	(−1.03, 0.41)	(−1.28, 0.67)
	24	−0.07	−0.53*	0.19	0.65	−0.04	−0.17	−0.11	−0.25
		(−0.63, 0.48)	(−1.15, 0.09)	(−0.10, 0.47)	(−1.76, 3.07)	(−0.62, 0.54)	(−0.73, 0.38)	(−0.82, 0.60)	(−1.30, 0.80)
	36	0.30	−0.24	0.56***	0.73	0.36	0.42	0.33	−0.24
		(−0.27, 0.88)	(−0.94, 0.47)	(0.25, 0.86)	(−0.47, 1.93)	(−0.24, 0.97)	(−0.27, 1.11)	(−0.40, 1.05)	(−1.05, 0.57)
	48	0.82*	0.41	1.12***	1.62	0.87*	1.09*	0.89	0.15
		(−0.13, 1.76)	(−0.79, 1.61)	(0.45, 1.79)	(−2.92, 6.17)	(−0.12, 1.87)	(−0.07, 2.26)	(−0.45, 2.23)	(−0.87, 1.18)
Mortgage Debt	12	−0.09	−0.47	−0.02	0.05	−0.07	−0.16	−0.22	−0.32
		(−0.53, 0.34)	(−1.10, 0.16)	(−0.37, 0.32)	(−1.64, 1.74)	(−0.51, 0.36)	(−0.66, 0.35)	(−0.73, 0.28)	(−0.81, 0.17)
	18	0.30	−0.06	0.32***	1.09	0.31	0.20	0.29	0.18
		(−0.11, 0.72)	(−0.57, 0.44)	(0.08, 0.56)	(−1.30, 3.48)	(−0.13, 0.75)	(−0.21, 0.62)	(−0.23, 0.81)	(−0.55, 0.91)
	24	0.40*	0.02	0.45***	1.25	0.41*	0.29	0.42	0.18
		(−0.01, 0.81)	(−0.46, 0.49)	(0.23, 0.68)	(−1.01, 3.50)	(−0.02, 0.84)	(−0.09, 0.67)	(−0.12, 0.96)	(−0.59, 0.94)
	36	0.54**	0.08	0.63***	1.05**	0.57***	0.58**	0.54**	0.03
		(0.13, 0.95)	(−0.54, 0.70)	(0.42, 0.85)	(0.06, 2.03)	(0.14, 1.00)	(0.09, 1.06)	(0.01, 1.07)	(−0.57, 0.63)
	48	1.03***	0.60	1.21***	1.79	1.07***	1.24***	1.09**	0.45
		(0.31, 1.76)	(−0.45, 1.65)	(0.69, 1.73)	(−1.87, 5.46)	(0.31, 1.84)	(0.33, 2.15)	(0.03, 2.14)	(−0.30, 1.20)
Originations	12	1.32***	0.41	2.09***	−0.23	1.39***	1.32***	1.14*	1.47***
		(0.44, 2.20)	(−1.47, 2.28)	(1.39, 2.78)	(−5.14, 4.69)	(0.51, 2.26)	(0.40, 2.23)	(−0.01, 2.28)	(0.48, 2.46)
	18	2.14***	1.40*	2.93***	1.56	2.20***	2.00***	2.04***	2.38***
		(1.32, 2.96)	(−0.02, 2.83)	(2.39, 3.47)	(−1.86, 4.98)	(1.38, 3.03)	(1.13, 2.88)	(0.88, 3.20)	(1.19, 3.57)
	24	2.52***	1.74***	3.22***	2.79*	2.59***	2.35***	2.55***	2.63***
		(1.68, 3.35)	(0.61, 2.88)	(2.66, 3.77)	(−0.21, 5.79)	(1.73, 3.45)	(1.48, 3.22)	(1.40, 3.70)	(1.05, 4.20)
	36	3.40***	2.51***	3.79***	4.43***	3.53***	3.56***	3.70***	2.69***
		(2.10, 4.71)	(1.27, 3.75)	(2.97, 4.61)	(1.29, 7.57)	(2.17, 4.89)	(2.00, 5.12)	(1.97, 5.44)	(0.92, 4.46)
	48	3.96***	3.39***	4.30***	5.59	4.07***	4.29***	4.35***	3.06***
		(2.20, 5.72)	(1.47, 5.30)	(2.98, 5.63)	(−2.41, 13.60)	(2.22, 5.93)	(2.13, 6.45)	(1.81, 6.90)	(1.23, 4.89)
Sample:		67M1-06M12	67M1-14M12	82M10-06M12	67M1-06M12	67M1-06M12	67M1-06M12	67M1-06M12	71M09-06M12
Modification:		Benchmark	Full Sample	Post-1982 Sample	Omitting Sept 2004	Omitting Dec 1982	Omitting Oct 1977	Controls incl. Pool Issues	Controls incl. GSE stock price

Notes: Numbers are dollar amounts. Estimates are from local projections-IV regressions, see equation (1.2), using non-cyclical policy events as the instrument. 95% Newey and West (1987) confidence bands in parentheses. Asterisks denote 10%, 5%, or 1% significance.

All variations of the baseline specification reported in Table A.2 yield cumulative origination multipliers in the range of 2.5 to 4.5 after 3 to 4 years. Moreover, the impact on originations is consistently highly statistically significant. The estimated cumulative change in mortgage debt also remains in the range of the benchmark specification. The credit multipliers are the lowest when we extend the sample to include the recent financial crisis (column [2]) and when we add the GSE to S&P 500 stock price ratio to the control set (column [8]). In

these cases, the impact on mortgage debt is no longer significant at conventional levels. We also highlight that the inclusion of the September 2004 policy event is important for the precision of the estimates. The instrument that omits the 2004 event is generally weaker and produces wider confidence bands. On the other hand, omitting the 1977 and 1982 events (columns [5] and [6]) does not have a large influence on the results.

Impulse Responses of Mortgage Originations by Type

This section discusses additional results regarding the effects of news shocks to agency purchases on mortgage originations by type. The available data allows us to distinguish between refinancing and purchase originations (see data appendix). The average share of refinancing originations in the 1967-2006 sample is 25% (and 28% in the 1967-2014 sample). The refinancing share is volatile and ranges from values of 10% during the high nominal interest rates of the late 1970s and early 1980s, to up to 75% during refinancing booms.

Figure A.8 shows point estimates for the first 24 months after an increase in anticipated purchases by one percentage point of trend originations, together with 95% Newey and West (1987) confidence bands. For reference, the left panel repeats the responses of total mortgage originations shown in Figure 1.7. The middle panel shows the estimated response of refinancing originations, while the right panel shows the estimated response of originations financing the purchase of a home. We note that for the estimates in these two panels, the sample excludes May 1985 to December 1986 because of missing data on refinance shares, see data appendix.

The results in Figure A.8 are consistent with those for the dollar credit multipliers reported in Section 1.5. Refinancing originations show a gradual increase following the agency purchase shock. Purchase originations also rise, but with a longer delay relative to refinance originations. Purchase originations are initially lower for the first six months or so, before rising between 12 and 24 months. Using the average share of refinancing originations of 25% over the benchmark sample, the estimates in Figure A.8 imply that refinancing originations account for the larger share of the increase in total originations.

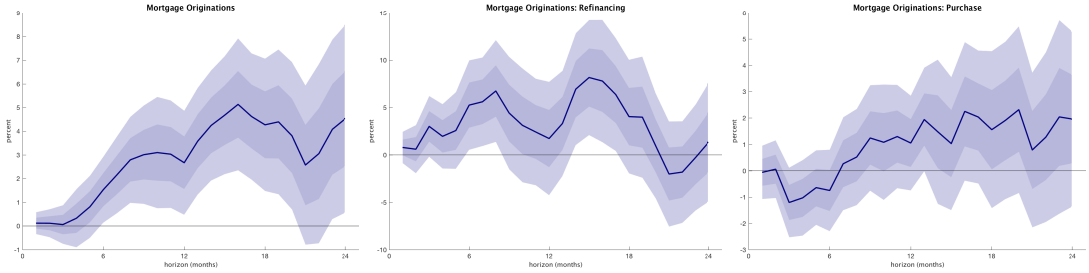

Figure A.8. Impulse Responses to a Shock to Anticipated Agency Purchases

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006. In the middle and right panels, the sample excludes May 1985 to Dec 1986 because of missing data on refinance shares, see data appendix.

Figure A.9 compares the response of originations to a traditional monetary policy shock (in red) with the response to the agency purchase shock identified using the narrative instrument (in blue). Responses to monetary shocks are identified using the Romer and Romer (2004) monetary policy shock measure as an instrument, as explained in Section 1.7. As in Figure 1.12, the impact of the interest rate shock is scaled such that the maximum decline in the 3-month T-bill rate is identical as for the agency purchase shock identified with the narrative instrument. The left panel repeats the responses of total mortgage originations

shown in Figure 1.12 and shows that the agency purchase shock generates a larger increase in total originations. The middle panel shows the responses of refinancing originations, while the right panel shows the estimated responses of originations financing the purchase of a home. The results in Figure A.9 indicate that the differential impact on total originations is due to the different impact on refinancing activity. The response of purchase originations (right panel) is very similar in timing and size across both shocks. The response of refinancing originations to monetary policy shock, on the other hand, is much more muted than the response to the agency purchase shocks.

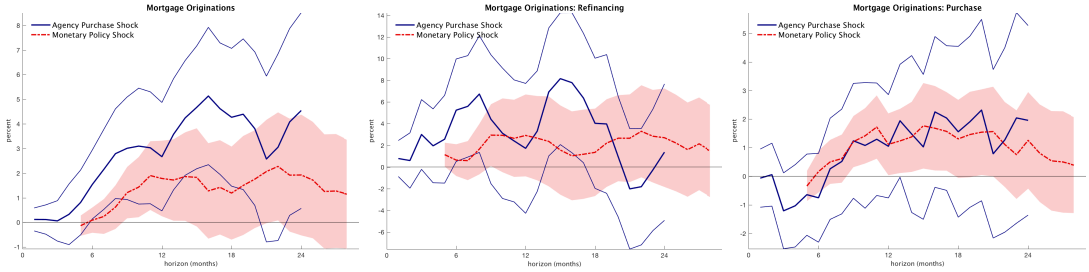

Figure A.9. Responses to a Shock to Anticipated Agency Purchases Versus a Monetary Policy Shock

Notes: The figure shows responses to a one pp. increase in the expected future agency market share as well as the response to a monetary policy shock. Estimates are from local projections-IV regressions instrumenting agency commitments with the narrative policy indicator, see equation (1.3), and instrumenting the 3 month T-Bill rate with the Romer and Romer (2004) monetary policy shock measure. Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006. In the middle and right panels, the sample excludes May 1985 to Dec 1986 because of missing data on refinance shares, see data appendix.

Impulse Response Analysis: Sensitivity Checks

1. Omitting the 1977-1982 and NBR-targeting Periods. Figure A.10 shows the response to a shock to anticipated agency purchases by one percentage point of trend originations, together with 95% Newey and West (1987) confidence bands. Each figure shows results based on the narrative instrument for two different

subsamples. The first subsample omits the period of non-borrowed reserves targeting under the Volcker chairmanship of the Federal Reserve from October 1979 to August 1982. The second subsample omits the 6 years between 1977 and 1982, which are more broadly characterized by relatively high interest rate volatility. Each of the excluded periods contain several sizable credit policy changes as well as a greater incidence of large monetary policy shocks in the Romer and Romer (2004) measure. Their exclusion allow us to verify the role of these parts of the sample for our results regarding the interactions between the two types of policies. The results in Figure A.10 are qualitatively very similar to those of the full sample, and in both cases include both a significant rise in originations as well as declines in short- and long-term interest rates. Compared to the full sample, the rise in the stock of mortgage debt is, however, no longer evident when we omit the 6 years between 1977 and 1982.

2. Post-1982 Sample. Figure A.11 shows the response to a shock to anticipated agency purchases based on a shorter sample that starts in October 1982 instead of December 1967. The Figure reports results for agency purchases instrumented with the narrative instrument, as in Figure 1.7. The October 1982 starting period marks the end of the period of non-borrowed reserves targeting by the Federal Reserve and selects a period of more stable and inflation averse monetary policy. Because of the smaller sample, we omit in this case the cyclical controls (personal income and unemployment) to reduce the number parameters to be estimated. The results remain qualitatively very similar to those of the full sample, indicating a rise in originations and declines in short- and long-term interest rates. Compared to the full sample, the rise in the of stock mortgage debt is slightly smaller.

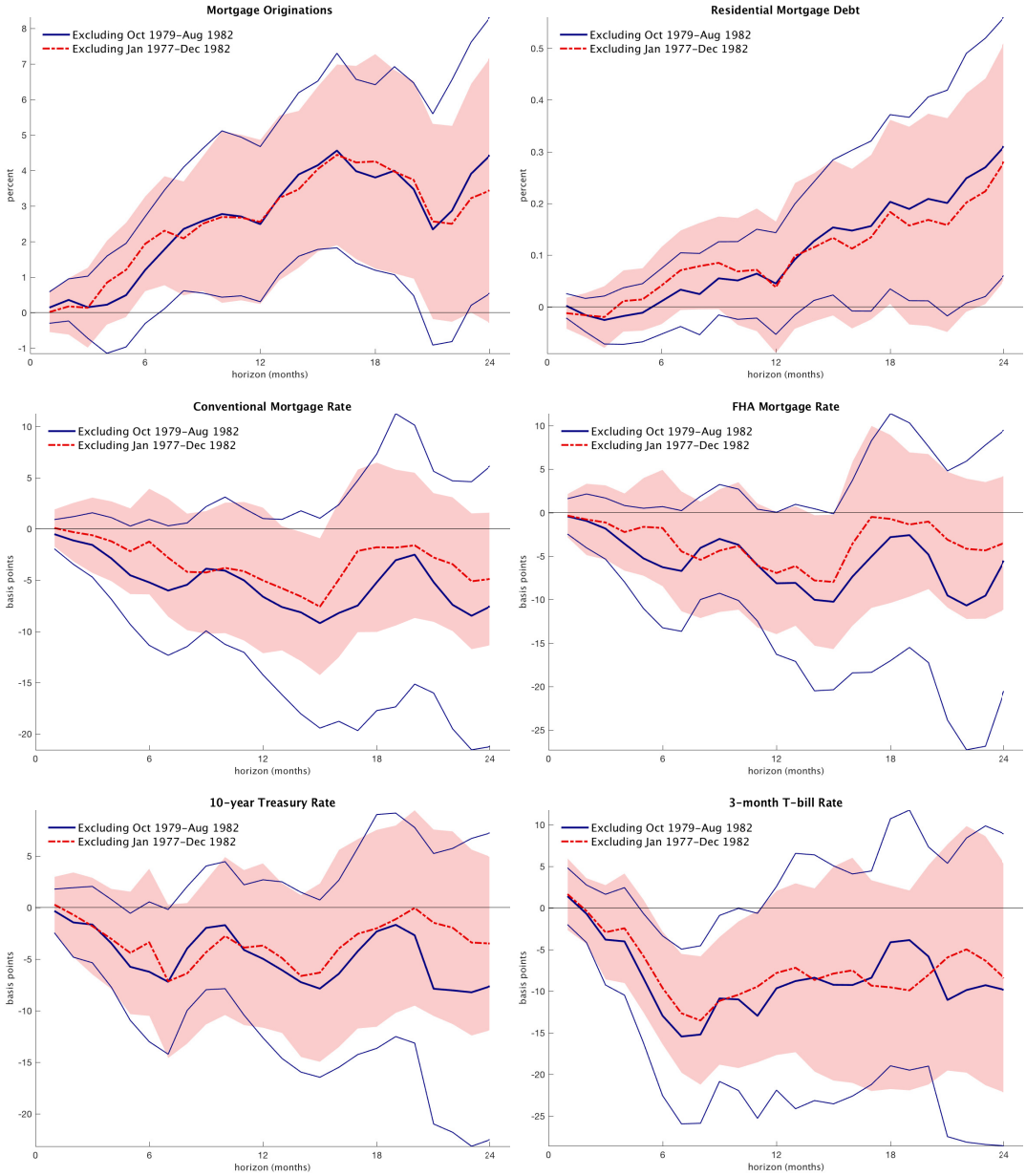

Figure A.10. Impulse Responses Excluding 1977-1982 and NBR Targeting Periods

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006, excluding the period indicated.

3. Including Romer and Romer (2004) Shocks as Controls. Figure A.12 compares the benchmark narrative impulse response estimates of Figure 1.7 with those

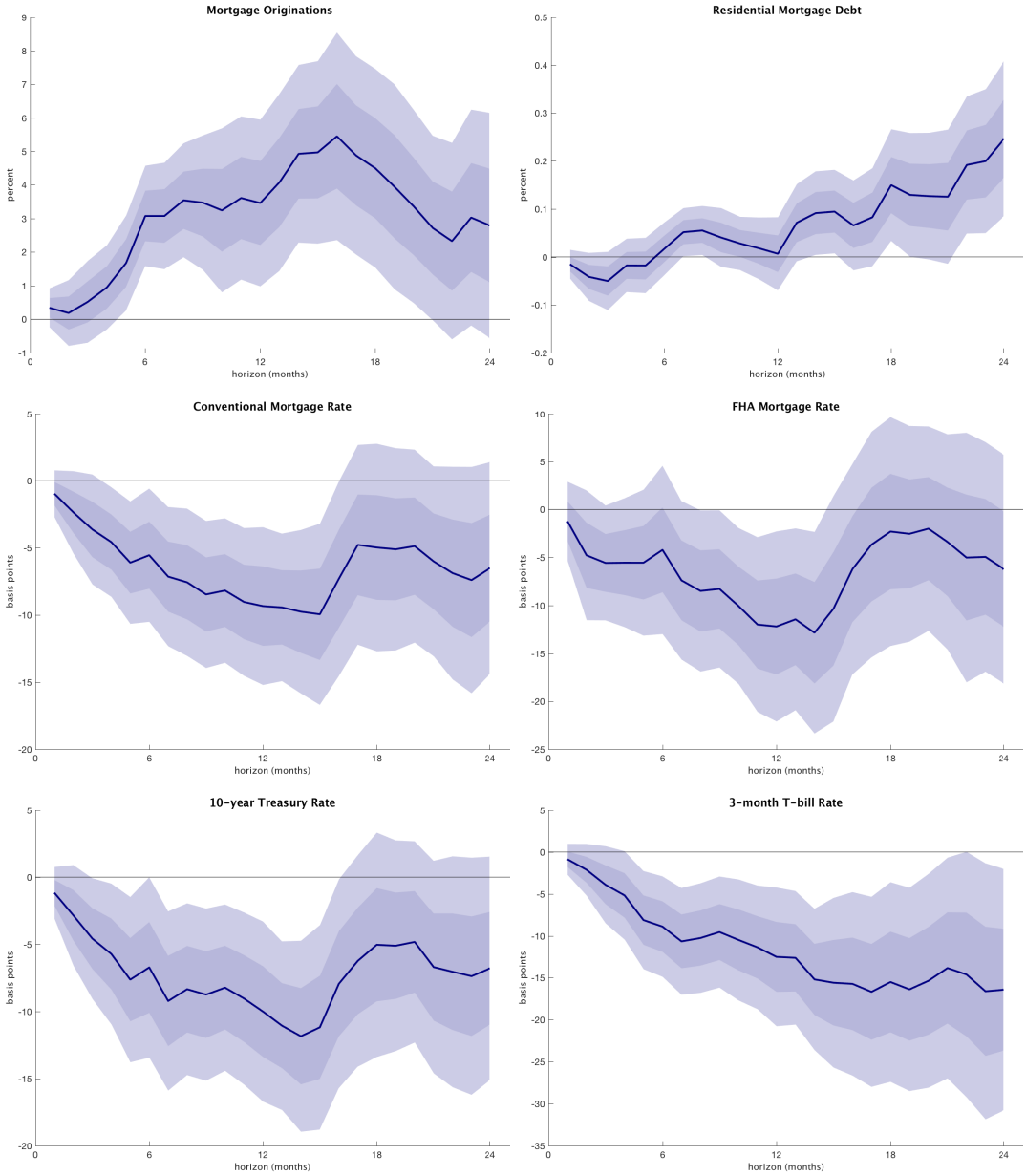

Figure A.11. Impulses Responses in the Post-1982 Sample

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Oct 1982 to Dec 2006.

from a specification that includes both the contemporaneous value as well as 12 lags of the Romer and Romer (2004) monetary shock measure as additional controls. Figure A.12 shows that controlling for the Romer and Romer (2004)

shocks has little effect on the estimation results.

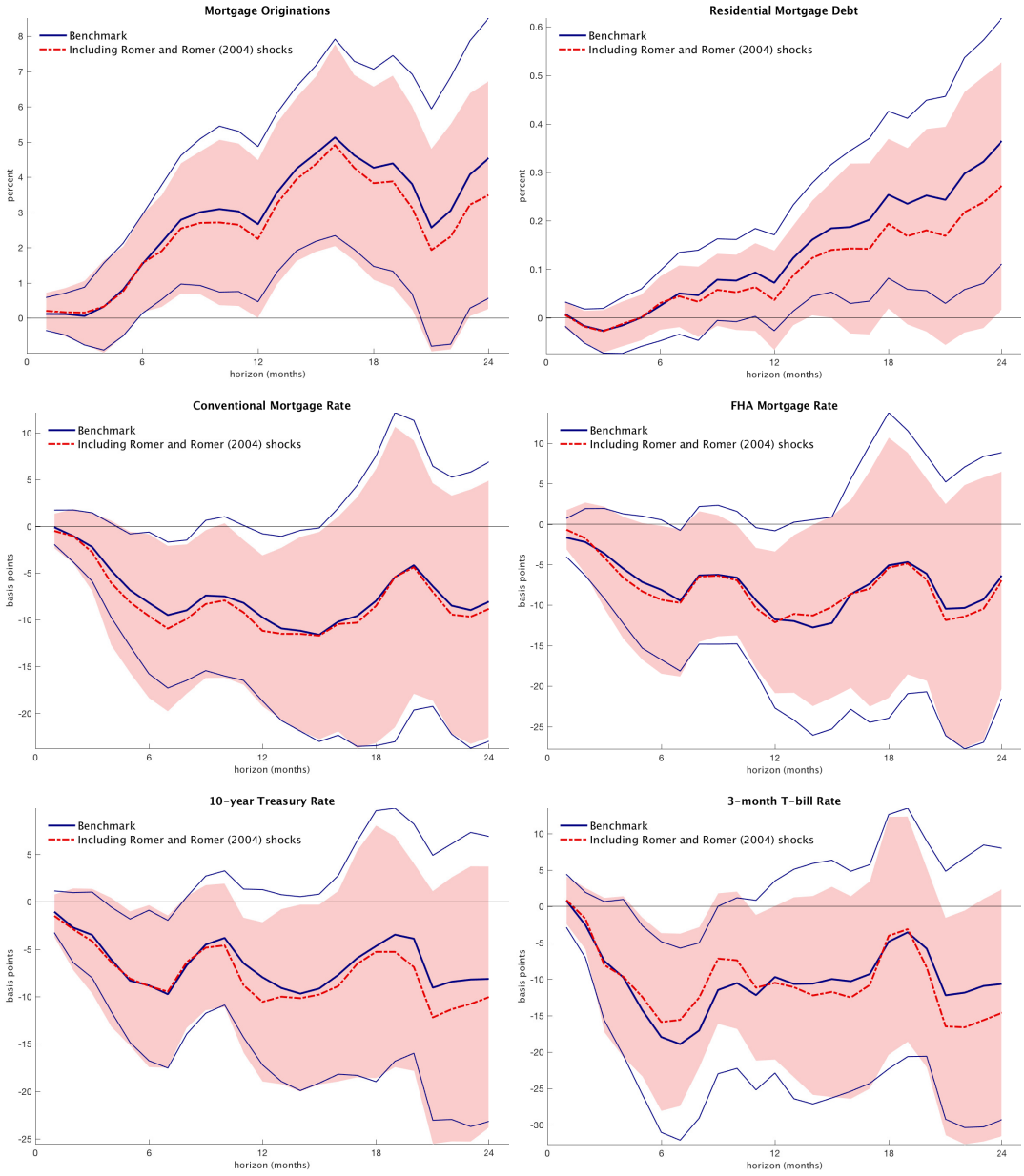

Figure A.12. Controlling for Romer and Romer (2004) Shocks

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Benchmark estimates are from local projections-IV regressions instrumented with the narrative policy indicator, see equation (1.3). The new specification includes additionally the contemporaneous value and 12 lags of the Romer and Romer (2004) shocks as controls. Finer lines and shaded areas are 95% Newey and West (1987) confidence bands. Sample: Jan 1967 to Dec 2006.

Alternative Versions of the GSE Excess Returns Instrument

As described in appendix II, the GSE excess returns shocks are defined as the residual in the regression given in (A.1). Our benchmark specification controls for returns on the market portfolio, as well as on a real estate sector portfolio. This section presents results based on several alternative versions of the excess returns instrument that are obtained by adding additional contemporaneous regressors in the vector W_t relative the benchmark results in the paper. Each of the additional variables are obtained from the data library on the homepage of Kenneth French at `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french`

Figure A.13 shows the results after adding the excess return on a value-weighted banking sector portfolio, and Figure A.14 after adding the excess return on a value-weighted finance sector portfolio. The return variables exclude dividends and are expressed relative to the overall market return. Figure A.15 shows the results after adding the Fama-French value and size factors. All the additional results are very close to those reported in Figure A.3.

Forecast Error Contributions from an SVAR Model

The local projections-IV specifications do not allow an assessment of the historical role of structural shocks to housing credit policy, which requires knowledge of the variance contribution of these shocks to the cumulative purchase measures in equations (1.2) or (1.3). In order to gain some insight into the importance of GSE activity for the dynamics of credit aggregates and interest rates, this section estimates the variance contribution of the GSE excess returns shocks

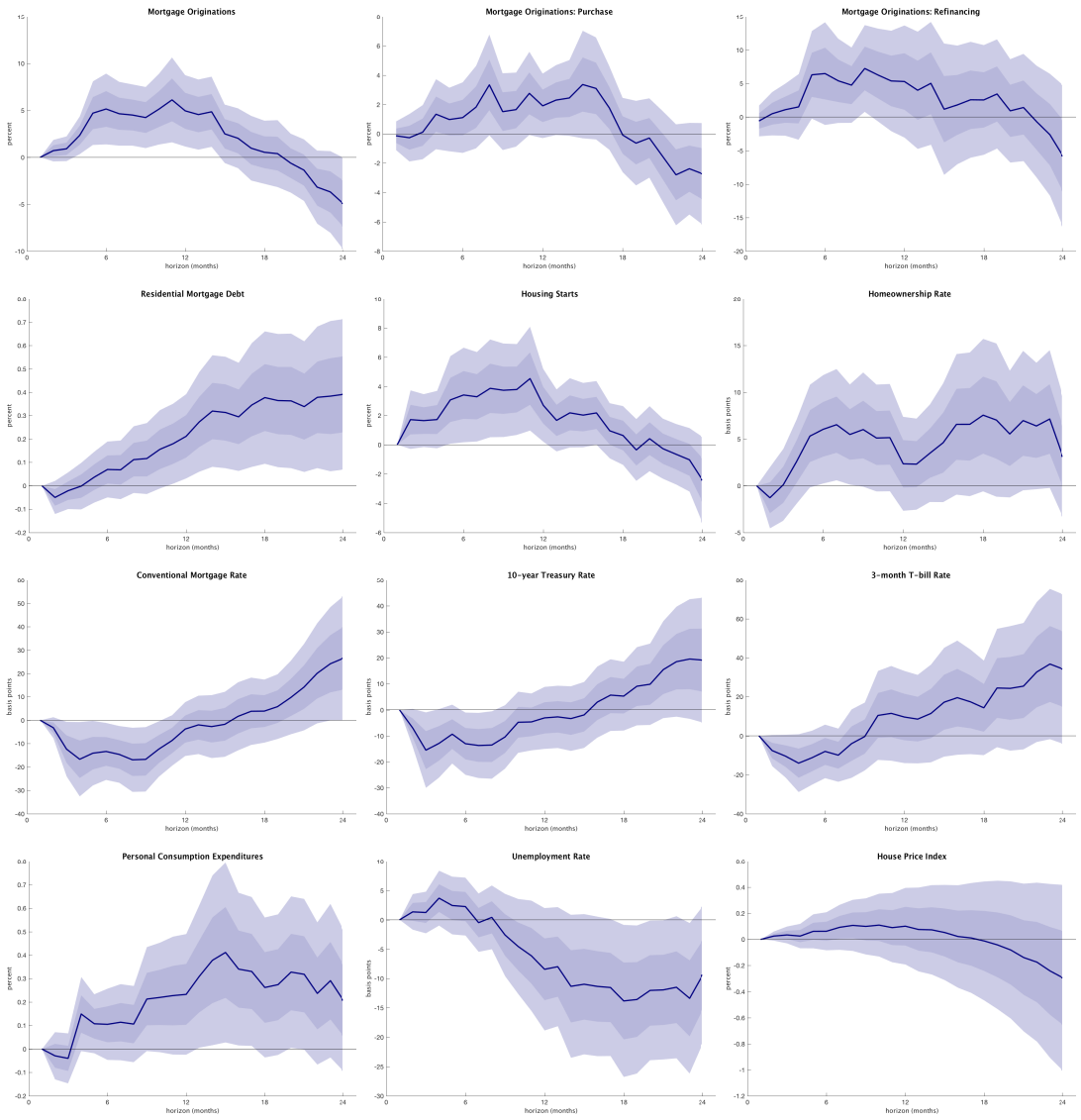

Figure A.13. Controlling for Banking Sector Excess Returns

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the GSE excess stock returns innovations, see equation (A.2). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

in a structural vector autoregressive (SVAR) model. The main finding is that the contribution of GSE excess returns shocks to the short-run variability of mortgage credit and housing starts is roughly as important as that of monetary policy shocks. In addition, shocks to monetary policy are substantially more important

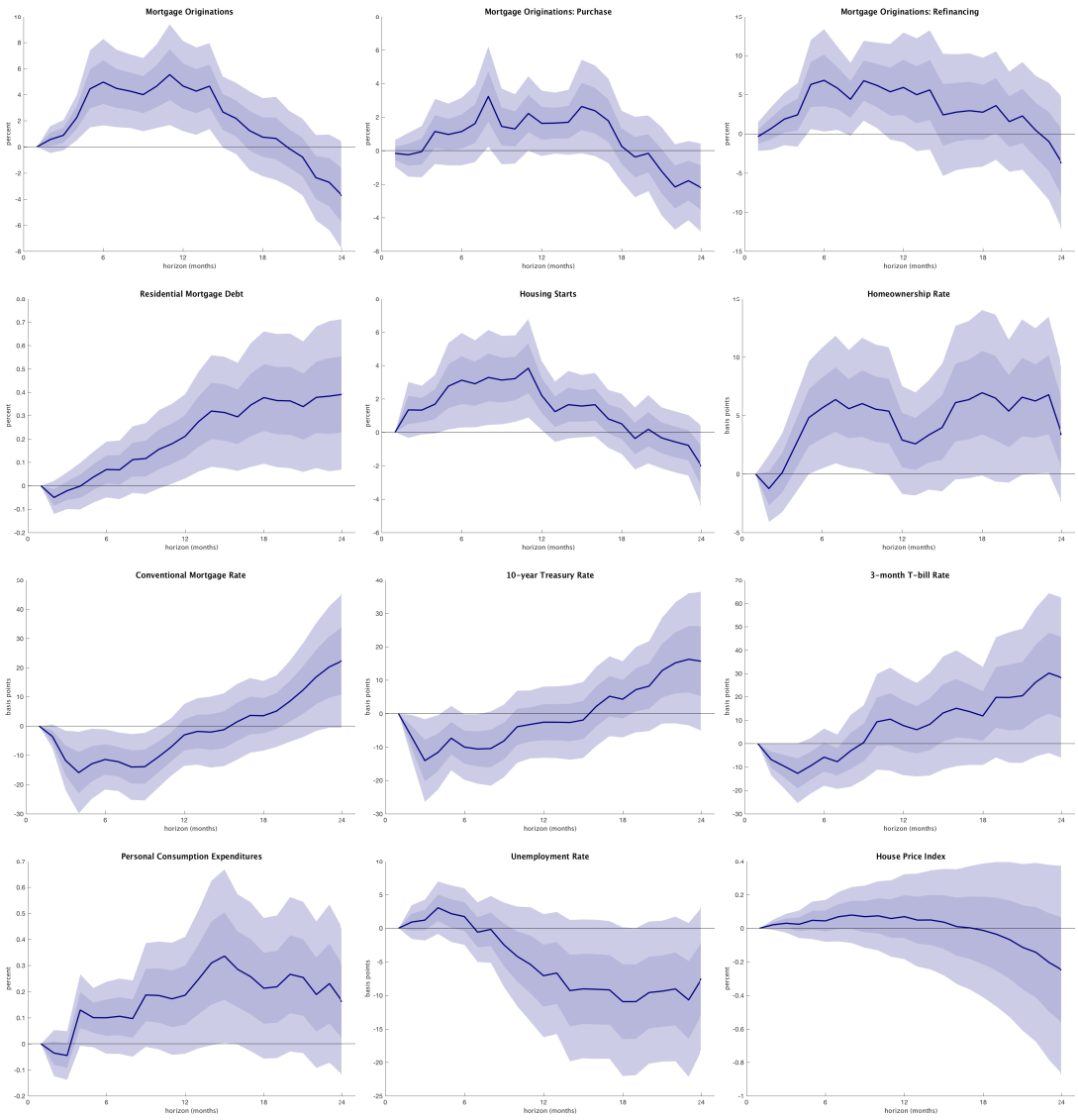

Figure A.14. Controlling for Finance Sector Excess Returns

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the GSE excess stock returns shocks, see equation (A.2). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

for the forecast error variance of interest rates in the short run. The role of GSE excess returns shocks for long-term interest rates exceeds the one of monetary policy shocks at horizons beyond 18 months.

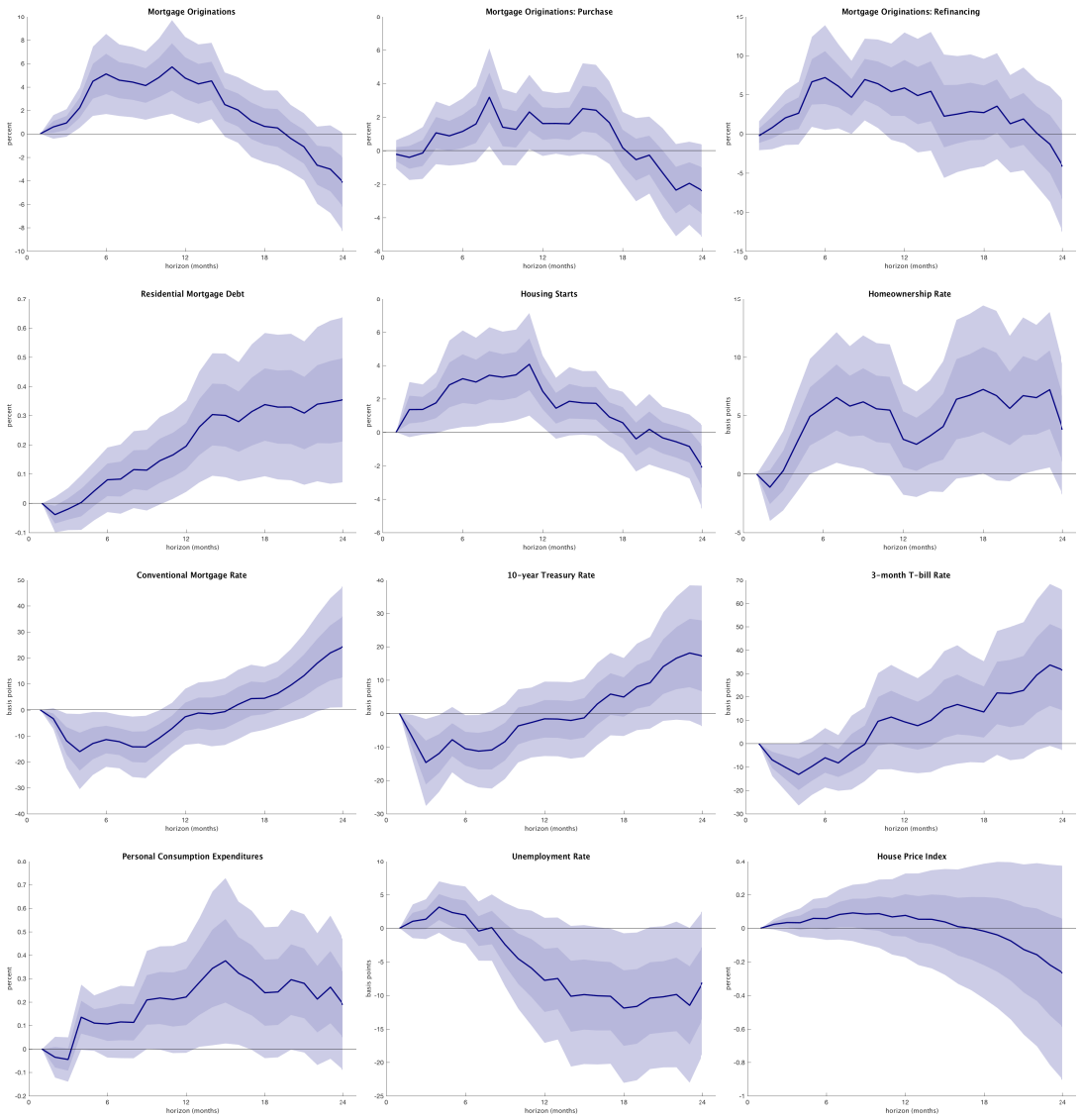

Figure A.15. Controlling for Fama and French (1993) Size and Value Factors

Notes: The figure shows responses to a one pp. increase in the expected future agency market share measured by agency commitments as a ratio of trend originations. Estimates are from local projections-IV regressions instrumented with the GSE excess stock returns shocks, see equation (A.2). Shaded areas are 68% and 95% Newey and West (1987) confidence bands. Sample: Sep 1970 to Dec 2006.

In order to estimate forecast error variance contribution of shocks to GSE activity, we adopt a VAR model for the joint dynamics of the ratio of agency purchases and commitments to trend originations, as well as all of the variables included as controls in the LPIV regressions: the log levels of core PCE

and house price indices, the log difference of total mortgage debt, the log levels of real mortgage originations and housing starts, the 3-month T-bill rate, the 10-year Treasury rate, the conventional mortgage interest rate, the BAA-AAA corporate bond spread, the unemployment rate, and the log of real personal income. In addition, the VAR system also includes the cumulative difference in returns between (1) the Fama-French market portfolio and a risk free portfolio, (2) GSE stock and the market portfolio, and (3) the Fama-French real estate and market portfolios. We estimate the VAR by OLS using 12 lags of all the endogenous variables and using monthly data from September 1970 to December 2006.

The impact of a shock to orthogonalized GSE excess returns is the response to an innovation to the GSE stock index variable, which is obtained by taking the lower triangular Choleski decomposition of the estimated covariance matrix of the VAR residuals, ordering all of the variables except agency purchases/commitments above the GSE stock index variable. This approach imposes the same exclusion restrictions as the LPIV model in (1.3) within the SVAR context, which amounts to assuming that none of the variables ordered before the GSE stock index variable responds within the same month to orthogonalized GSE excess returns innovations.

Figure A.16 shows the resulting impulse responses, which for ease of comparison are scaled to imply a similar 6-month impact on originations as the LPIV estimates in Figure 1.7. The GSE excess returns shocks lead to statistically significant increases in agency net commitments and net purchases (not shown). Consistent with our main findings, Figure A.16 shows that originations, mortgage debt, and housing starts all rise significantly following a positive innovations in GSE excess returns, while interest rates decline in the short run. The

SVAR estimates are generally very similar to those obtained using LPIV regressions using the GSE excess returns shocks as an instrument for agency mortgage purchases.

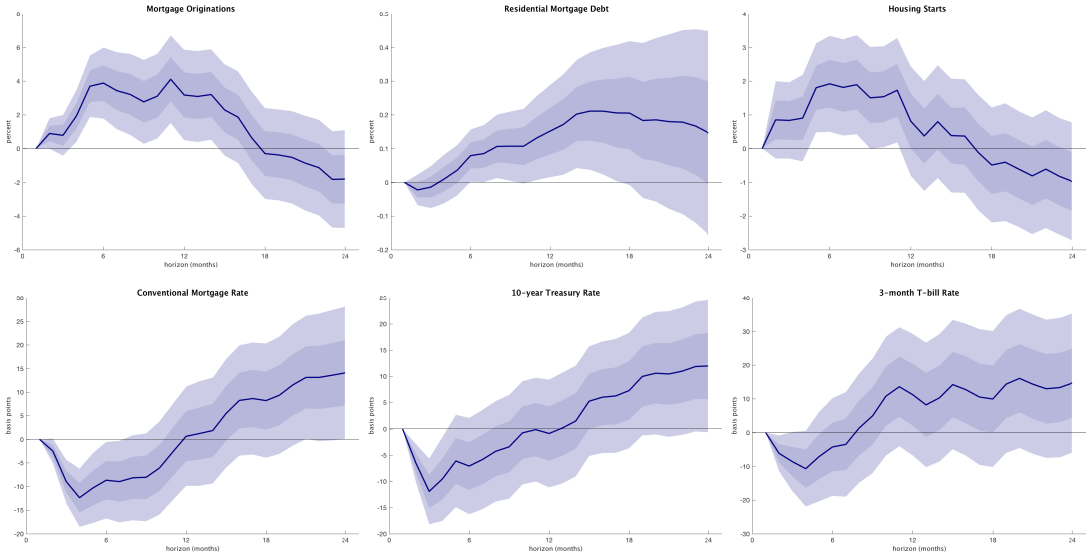

Figure A.16. SVAR Impulse Responses to a GSE Excess Returns Shock

Notes: The figure shows SVAR impulse responses to an innovation in orthogonalized GSE excess returns.Shaded areas are 68% and 95% confidence bands obtained from a residual wild bootstrap using 10,000 replications. Sample: Sep 1970 to Dec 2006.

An advantage of the SVAR model is that it is straightforward to evaluate the relative importance of shocks in driving fluctuations in the endogenous variables. Figure A.17 depicts the share of the forecast error variance at various horizons that is due to the identified GSE excess returns shocks. For comparison, Figure A.17 also shows the variance contribution of monetary policy shocks identified using the Romer and Romer (2004) measure as a proxy using the methodology in Stock and Watson (2012) and Mertens and Ravn (2013). We find that the GSE excess returns shocks explain up to 8% of the agency net purchases and commitments forecast variance (not shown). The contribution of monetary policy shocks remains below 2% at all horizons considered.

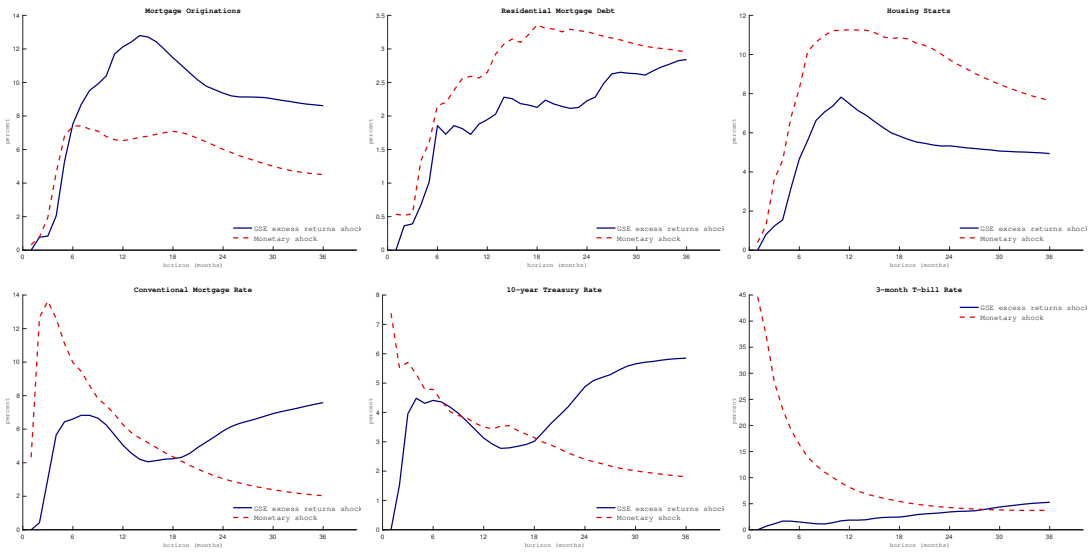

Figure A.17. Forecast Error Variance Contributions of Monetary and GSE Excess Returns Shocks

Notes: The figure shows contributions to the forecast error in the SVAR model. Monetary policy shocks are identified using the Romer and Romer (2004) measure as external instrument. GSE excess returns shocks are identified as described in appendix II. Sample: Sep 1970 to Dec 2006.

Figure A.17 reveals that both shocks account for a substantial fraction of the forecast variance of originations and housing starts at horizons beyond 6 months. GSE excess returns shocks explain up to 12% of the forecast variance of originations at horizons between 12 and 18 months, and around 7% to 8% of housing starts between 8 and 14 months. In comparison, monetary shocks explain between 6% to 8% of originations, and around 11% of housing starts at similar horizons. Neither of the shocks accounts for much of the forecast variance of the stock of mortgage debt at horizons up to 36 months. Monetary shocks account for a substantial share of the short-run forecast variance of the 3-month T-bill rates, and up to 14% and 7%, respectively, of the variance in mortgage and 10-year Treasury rates at horizons shorter then 6 months. GSE excess returns shocks are relatively less important for the variability in interest rates at shorter horizons, but become relatively more important than monetary

policy shocks in accounting for the uncertainty in long-term interest rates at horizons exceeding 18 months.

BIBLIOGRAPHY

Fama, Eugene F. and Kenneth R. French, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33 (1993), 3–56.

Mertens, Karel and Morten O. Ravn, "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Review*, 103 (2013), 1212–1247.

Romer, Christina D. and David H. Romer, "A New Measure of Monetary Shocks: Derivation and Implications," *American Economic Review*, 94 (2004), 1055–1084.

Stock, James H. and Mark W. Watson, "Disentangling the Channels of the 2007-2009 Recession," *Brookings Papers on Economic Activity*, 1 (2012), 81–135.

APPENDIX B

APPENDICES TO CHAPTER 2

Appendix B1: Institutional Background and Overview of Narrative Instruments

Uncle Sam as Mortgage Lender: A Brief History of U.S. Housing Credit Policy

Distress in housing and mortgage markets during the Great Depression prompted the first large-scale federal housing credit policy interventions. Prior to the Depression, U.S. mortgage contracts were typically structured as non-amortizing balloon loans with maturities of no more than six years and high downpayment requirements (loan-to-value ratios not exceeding 60%). This mortgage financing system collapsed during the Depression due to widespread bank failures and the effects of deflation increasing real mortgage liabilities and depressing home values; the U.S. experienced an unprecedented foreclosure crisis as households and banks could no longer roll over maturing mortgages.[1] Residential investment also collapsed ahead of and during the Depression, with housing starts falling 90% between 1925 and 1933; see Leamer (2007).

Against this backdrop, Congress and the Hoover Administration created the Federal Home Loan Banks (FHLBanks) to bolster mortgage lending in 1932. Modeled after the Federal Reserve System, the Federal Home Loan Bank Sys-

[1]Single-family home prices fell roughly 24% between 1929 and 1933; see Rose (2011) for a broader overview of housing market distress during the Depression.

tem was designed as a network of 12 regional FHLBanks that would provide a liquidity backstop for mortgage lenders in their respective districts. The FHLBanks were chartered to provide member institutions with wholesale loans, termed "advances," that were secured by members' mortgages.

To ameliorate the foreclosure crisis, Congress created and championed a new class of long-term, fixed-rate, self-amortizing mortgages, initially through the Home Owners' Loan Corporation (HOLC) mortgage refinancing program and new Federal Housing Administration (FHA)-insured mortgages. In 1933, Congress created the HOLC, a public utility that purchased distressed mortgages and refinanced them as longer-maturity, self-amortizing loans; see Rose (2011). A year later, the National Housing Act of 1934 established the FHA, which began insuring default risk on mortgages for qualifying borrowers; the FHA-backed mortgages were long-term, fixed-rate, self-amortizing mortgages with a modest loan limit. Depository institutions were initially reluctant to hold long-term, government-insured mortgages, prompting Congress to charter secondary markets to increase liquidity for mortgage originations. The Reconstruction Finance Corporation (RFC) and its subsidiary RFC Mortgage Company initially supported a limited secondary market for FHA-insured mortgages. In 1938, Congress chartered the Federal National Mortgage Association (FNMA, or Fannie Mae) to support a permanent, liquid secondary market for FHA-insured mortgages.

Shortly before the end of World War II, the Veterans Administration (VA) established a mortgage guarantee program, enabling veterans to obtain subsidized loans on favorable terms. The VA loan-guarantee program was intended in part as a cheap alternative to cash bonuses. Congress additionally intended

to simulate housing construction, both to ameliorate a national housing shortage as millions of soldiers returned and to keep the nation from slipping back into depression as military spending receded. Residential investment had remained depressed throughout the 1930s and ensuing war effort. Eligibility for the VA loan-guarantee program was expanded following the Korean War and every subsequent major military intervention. FNMA was rechartered in 1948 to support a secondary market for both VA-guaranteed and FHA-insured mortgages.

The focus of U.S. housing policy began to shift toward clearing Depression-era slums and "urban renewal," particularly with passage of the Housing Act of 1954; the use of secondary mortgage markets was expanded to support new types of FHA mortgages for urban redevelopment. In light of a highly regulated, regionally fragmented banking sector, the secondary mortgage market was additionally intended to reallocate mortgage credit from regions with excess savings to regions with high demand for mortgage loans, smoothing mortgage availability across both the country and the credit cycle. The United States experienced numerous credit crunches and bouts of disintermediation during the 1950s, 1960s, and 1970s, when the Fed actively regulated interest rate ceilings on demand deposits and savings accounts; see Eckstein and Sinai (1986) and Mertens (2008).[2] Congress began more actively using secondary markets to increase liquidity for mortgage lending, particularly during credit crunches and downturns in construction activity.

The Housing and Urban Development Act of 1968 split off the secondary mortgage market functions of FNMA into a quasi-private, shareholder-owned

[2]Every recession between the mid-1950s and the early 1980s was preceded by a credit crunch; see Eckstein and Sinai (1986).

Fannie Mae; regulation of Fannie was principally overseen by the Department of Housing and Urban Development (HUD). The remaining FNMA functions were transferred to a newly created Government National Mortgage Association (GNMA) owned and operated by HUD. Ginnie Mae's initial role largely entailed supporting demand for difficult-to-market classes of FHA mortgages and, at policymakers' behest, increasing mortgage purchases and subsidies during recessions.

Following a credit crunch the previous year, Congress chartered the Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac) in 1970 to support a secondary market for conventional mortgages originated by the thrift industry. Ownership of Freddie Mac was initially placed with the FHLBanks and their members, while the Federal Home Loan Bank Board was granted regulatory authority. Fannie, meanwhile, was authorized to expand its operations from purchasing smaller FHA/VA-backed loans to also purchasing larger conventional mortgages, enabling it to provide liquidity for a broader swathe of the mortgage market.

Congress authorized Fannie, Freddie, and Ginnie to issue securities in which the payments from a pool of mortgages are 'passed through' to the holder; mortgage-backed securities were intended to diversify credit risk, increase liquidity for standardized mortgages, and attract new sources of funds for residential mortgage lending. Ginnie issued the first modern mortgage pass-through security in 1970, backed with interests in FHA/VA mortgages. One year later, Freddie issued the first pass-through security for conventional mortgages. The agency MBS issued and guaranteed by Fannie, Freddie, and Ginnie are highly liquid securities that attract funding from institutional investors barred from

holding whole mortgages, such as pension funds.

The perception of an implicit government guarantee on agency securities increased investors' appetite for agency-guaranteed MBS. Only Ginnie MBS are explicitly backed by the U.S. Treasury Department. Investors assumed the Treasury would, if needed, backstop the agency securities issued by Fannie and Freddie. The perception of an implicit government guarantee stems from the GSE charters; Fannie was granted a limited statutory lending backstop with the U.S. Treasury when first authorized to issue bonds during a 1954 reform, and Congress later granted Freddie the same statutory lending backstop. The GSEs earn guarantee fees on their off-balance sheet MBS held by third parties, which were historically subject to negligible capital requirements. The share of U.S. residential mortgage debt pooled as agency MBS has—with the brief exception of the private-label securitization boom of the 2000s—steadily risen since mortgage securitization was popularized by Ginnie and Freddie in the early 1970s, as depicted in the left panel of Figure B.1. Since the early 1990s, between 30% and 55% of residential mortgage debt has been pooled as agency MBS.

The perception of an implicit government guarantee additionally lowered borrowing costs for Fannie and Freddie to nearly that of the U.S. Treasury Department, and well below wholesale funding costs of commercial banks. Combined with loose leverage and capital requirements, the safe asset premium on agency bonds afforded the GSEs a profitable business opportunity in highly leveraged holdings of mortgage investments. In the aftermath of the S&L crisis, Freddie was split from FHLBank ownership and rechartered as a publicly traded company in 1989, under the (loose) oversight of HUD.[3] After being pri-

[3]Ownership of the GSEs has been repeatedly restructured, oscillating between public and quasi-private. Fannie was rechartered as a publicly listed company in 1968 and Freddie in 1989, while the Treasury took a majority stake in both GSEs in 2008.

vatized, Freddie began to mimic Fannie's business model of leveraged balance sheet growth; profit motives and newfound competition propelled a rapid expansion of the GSEs' mortgage holdings, as depicted in the right panel of Figure B.1.

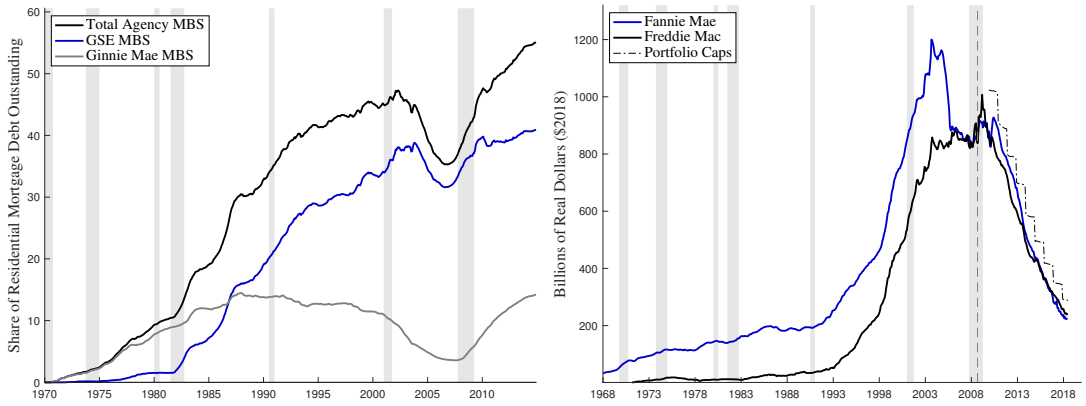

Figure B.1. Mortgage Securitization and Mortgage Holdings of Fannie Mae and Freddie Mac

Notes: Data have been seasonally adjusted using the Census Bureau's X-13 program. Gray bars correspond with NBER recession dates. The vertical dashed line marks the Treasury Department and Federal Housing Finance Agency taking Fannie and Freddie into conservatorship in September 2008. Sources: See the data appendix for details.

Political backlash to the S&L crisis stoked concerns on Capitol Hill that Fannie and Freddie might someday necessitate an unpalatable taxpayer bailout. A 1992 reform created the Office of Federal Housing Enterprise Oversight (OFHEO), an agency within HUD tasked with new regulatory authority over the safety and soundness of Fannie and Freddie. OFHEO, however, was politically hamstrung and only imposed non-binding capital constraints. During the Clinton Administration and then the early Bush Administration, policymakers again repurposed Fannie and Freddie to promote homeownership and affordable housing, particularly for lower-income households and neighborhoods as well as minority groups. Fannie and Freddie were assigned affordable housing goals and subgoals for their mortgage purchases, and their charters were

amended to place more emphasis on supporting multifamily mortgage lending.

Fannie and Freddie were effectively left balance sheet unconstrained in the 1990s and early 2000s, the result of their formidable lobbying clout, structurally weak regulatory oversight, and an emphasis on promoting the American Dream of homeownership supported by the GSEs, advocate groups, homebuilders, and much of Congress. The enterprises cornered the market for automated mortgage underwriting software and capitalized on the refinancing booms of the 1990s and early 2000s, which they used to gain market share. The GSEs began aggressively courting foreign institutional investors and marketing agency securities issues abroad, effectively intermediating the global savings glut toward U.S. mortgage lending. By the early 2000s, Fannie and Freddie held over $2 trillion in residential mortgage debt, or roughly 20% of that outstanding.

Accounting scandals surfaced first at Freddie and then at Fannie in the early 2000s, and the ensuing regulatory backlash arrested the GSEs' rapid portfolio growth. Disallowed hedging practices abruptly prompted a downward restatement of Fannie's capital by $9 billion in September 2004. OFHEO imposed capital surcharges and required Fannie to close a capital shortfall of $12.5 billion in one year, prompting Fannie to rapidly deleverage and reduce its mortgage holdings, as seen in the right panel of Figure B.1. The considerable lobbying clout of Fannie and Freddie ebbed and regulatory oversight of the GSEs increased; outright portfolio growth limits were imposed first on Fannie and then, rather unexpectedly, on Freddie in 2006.

The subprime lending and private-label mortgage securitization booms contributed to the GSEs losing market share ahead of the Great Recession. Af-

ter a refinancing boom ended in mid-2003, mortgage banks maintained origination volumes by originating more jumbo, subprime, and Alt-A mortgages. Private-label securitization of mortgages with lax underwriting standards exacerbated moral hazard and predatory lending, and credit quality rapidly deteriorated after mid-2003; conditioning on borrower characteristics, mortgage spreads abruptly contracted roughly 100 basis points (Justiniano et al., 2017). The GSEs were prohibited from securitizing these non-conforming loans and could only purchase them if accompanied with private mortgage insurance. The private-label securitization market share surged from roughly 20% in the early 2000s to 55% in 2005–2006 before the market all but evaporated in 2008–2009. But when turmoil started to foment in the subprime market in August 2007, Congress pushed Fannie and Freddie to start purchasing increased volumes of subprime loans, and the enterprises' portfolio caps were relaxed in September 2007.

In July 2008, regulatory authority over Fannie and Freddie was transferred from OFHEO to the Federal Housing Finance Agency (FHFA), a new independent federal agency. The FHFA was granted sweeping authority to take Fannie and Freddie into conservatorship if the GSEs were determined to be "critically undercapitalized," and the U.S. Treasury Department was temporarily authorized to make unlimited investments in the enterprises' securities. Facing mounting losses and collapsing share prices, Fannie and Freddie were taken into government conservatorship on September 7, 2008. In exchange for a guarantee of positive net worth and up to $100 billion in capital for each agency, the Treasury received warrants for a 79.9% ownership stake in each enterprise, as well as dividend-bearing senior preferred stock claims.[4]

[4]Federal budgetary rules require that the liabilities of any entity be placed on the federal budget ledger if the government owns an equity stake exceeding 80%, which the Bush and

After initially expanding their mortgage holdings during the Great Recession at the behest of their regulators, Fannie and Freddie were required to rapidly shrink their mortgage holdings in accord with a series of new portfolio caps, as depicted in the right panel of Figure B.1. The conservatorship agreements initially capped each enterprise's mortgage holdings at $850 billion as of December 31, 2009, to be reduced 10% annually until reaching $250 billion in 2021.[5] The initial caps were soon increased by $50 billion in February 2009, to support GSE mortgage refinancing under the Home Affordable Refinance Program.[6] In August 2012, a revision to the conservatorship agreements accelerated the wind-down of the GSEs' mortgage holdings to reach $250 billion in 2018. Fannie and Freddie have reduced their mortgage holdings to under $250 billion.

As federal regulators ordered Fannie and Freddie to wind down their mortgage holdings, the Fed launched and quickly ramped up a novel agency MBS purchase program.[7] Shortly after the agencies were taken into conservatorship, the Fed announced in November 2008 that it would purchase $500 billion worth of agency MBS and $100 billion in agency debt, the beginning of the Fed's first round of quantitative easing (QE1). In March 2009 the Fed announced that it would increase its purchases of agency MBS by $750 billion, and expand its purchases of agency debt up to $200 billion. In September 2011 the FOMC an-

Obama Administrations were eager to avoid.

[5]The caps were deliberately set well above the agencies' standing retained portfolio volumes, as regulators were pushing each to expand their mortgage holdings in support of the collapsing market; see Fieldhouse and Mertens (2017).

[6]The Treasury simultaneously increased its funding line for each enterprise from $100 billion to $200 billion, which was subsequently revised to an unlimited line of funding in December 2009.

[7]The Treasury Department also announced a smaller scale agency MBS purchase program when it took Fannie and Freddie into conservatorship, and purchased $220 billion in mortgage debt over September 2008–December 2009. The Treasury announced that it was unwinding its agency MBS portfolio in March 2011, and the last securities were sold off in March 2012.

nounced that it would redirect reinvestment of principal payments from agency debt and MBS holdings back into agency MBS, a departure from its standing policy of reinvesting payments into Treasuries. In September 2012 the Fed launched a third round of quantitative easing (QE3), announcing that it would purchase $40 billion in agency MBS each month, with no target volume or terminal date stipulated. The FOMC subsequently announced that it was tapering its monthly MBS purchases to $35 billion in December 2013, and announced the termination of all QE3 purchases in October 2014. The Fed, however, reaffirmed its policy of reinvesting principal payments from agency securities back into agency MBS. Consequently the Fed's mortgage holdings hovered around $1.75 trillion for the next three years, as depicted in the left panel of Figure B.2.

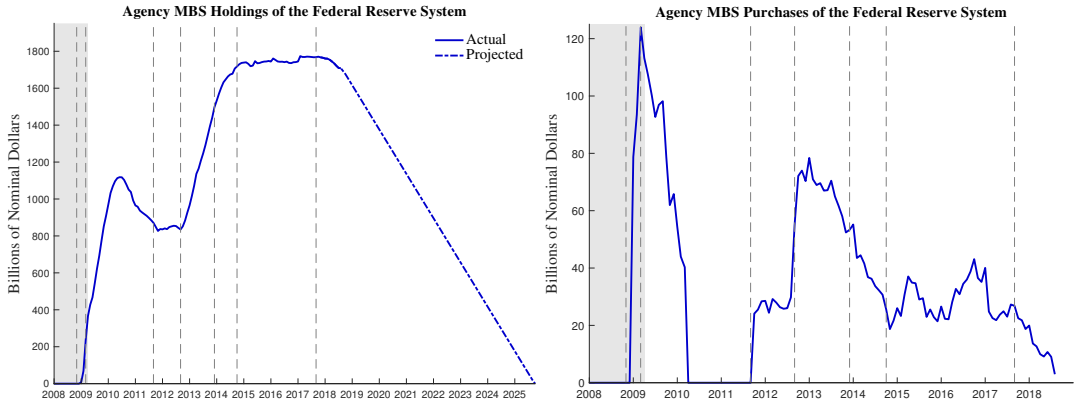

Figure B.2. Agency MBS Holdings and Purchases of the Federal Reserve System

Notes: Gray bars correspond with NBER recession dates. Vertical dashed lines correspond to the following related Federal Open Market Committee policy announcements: QE1 launch (11/25/2008), QE1 expansion (3/18/08), principal reinvestment (9/21/2011), QE3 launch (9/13/2012), QE3 taper (12/18/2013), QE3 termination (10/29/2014), and balance sheet normalization (9/20/2017). Purchases are aggregated monthly by transaction date. Sources: Board of Governors of the Federal Reserve System, Federal Reserve Bank of New York.

In September 2017 the FOMC announced that it would initiate a program of balance sheet normalization, meaning that it would reduce its asset holdings. At the time, the Fed was financing upwards of one-sixth of U.S. residen-

tial mortgage debt and holding roughly 30% of U.S. MBS outstanding. As part of the Fed's balance sheet reduction, the monthly volume of principal repayments reinvested into agency MBS was scheduled to be gradually lowered by a series of capped reductions starting in October 2017.[8] The schedule would reduce the Fed's purchases of agency MBS by up to $120 billion over October 2017–September 2018. The New York Fed stopped reinvestment purchase operations in mid-October 2018. Barring further policy adjustments, the last of the Fed's MBS holdings might run off by the end 2025 if holdings fall in line with the capped reductions, as projected in the upper panel of Figure B.2.[9]

Due to the falling mortgage holdings of Fannie, Freddie, and the Fed, the share of U.S. residential mortgage debt being financed by government agencies is projected to fall considerably based on current policy, as depicted in Figure 2.10. Congress is currently trying to write the next chapter of the history of Fannie Mae and Freddie Mac; government-sponsored secondary mortgage markets will surely persist in some form, but the balance between federal mortgage guarantees versus mortgage holdings may shift considerably.

[8]The New York Fed will reinvest only those repayments exceeding $4 billion in October–December 2017; $8 billion in January–March 2018; $12 billion in April–June 2018; $16 billion in July–September 2018; and $20 billion in October 2018 and beyond. Between terminating QE3 and beginning balance sheet "normalization" in October 2017, the Fed's policy of reinvesting agency securities repayments resulted in an average of $28.5 billion in net agency MBS purchases each month, as depicted in the lower panel of Figure B.2.

[9]If repayment rates exceed the $20 billion cap in any given month the capped reduction is an upper bound for the pace of balance sheet run off. Lower repayment rates below the cap would slow the pace of balance sheet run off, and the FOMC may decide to resume agency MBS reinvestment and maintain some holdings.

Policy Objectives and Public Mission: Statutory Charters of Fannie and Freddie

The GSEs have repeatedly been repurposed by Congress and used as public utilities to address new policy priorities, as loosely chronicled in Section B. Policy objectives have broadly included increasing the liquidity of mortgages, boosting construction to ameliorate housing shortages or support aggregate investment, attracting new sources of funding for mortgage lending, reallocating credit across regions of the country, harmonizing mortgage contracts to facilitate securitization, promoting homeownership and housing affordability for various constituencies, and expanding mortgage lending during credit crunches. To more concretely shed light on Congress's objectives behind chartering Fannie and Freddie and amending their public missions, this section reproduces Fannie Mae's statutory charter from Title III of the National Housing Act, as amended:

"*SEC. 301. DECLARATION OF PURPOSES OF TITLE*

The Congress declares that the purposes of this title are to establish secondary market facilities for residential mortgages, to provide that the operations thereof shall be financed by private capital to the maximum extent feasible, and to authorize such facilities to

1. *provide stability in the secondary market for residential mortgages;*
2. *respond appropriately to the private capital market;*
3. *provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income*

families involving a reasonable economic return that may be less than the return earned on other activities) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for residential mortgage financing;

4. *promote access to mortgage credit throughout the Nation (including central cities, rural areas, and underserved areas) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for residential mortgage financing; and*
5. *manage and liquidate federally owned mortgage portfolios in an orderly manner, with a minimum of adverse effect upon the residential mortgage market and minimum loss to the Federal Government.*"

See Fieldhouse and Mertens (2017) for the legislative history of revisions to the GSEs' statutory charters.

Overview of GSE Narrative Instruments

Shifting long-term priorities for federal housing policy, independent (often weak) regulatory oversight of the GSEs, and ad hoc policymaking gave rise to a considerable degree of regulatory policy variation affecting the mortgage holdings of Fannie, Freddie, and Ginnie. The Fieldhouse and Mertens (2017) narrative analysis parses primary and secondary sources to document the history of Fannie, Freddie, Ginnie, the Federal Reserve, and the U.S. Treasury Department as pertains to housing credit policy, emphasizing legislative, regulatory, or macro stabilization policies affecting the mortgage holdings of government agencies. The narrative analysis is intended to develop a time series of exoge-

nous regulatory shocks as valid instrumental variables for agency purchases of mortgage debt, proceeding in the following five steps:

1. Identifying significant policy changes expected to affect agency portfolios;
2. Quantifying a projected effect of each policy on agency retained portfolios;
3. Pinpointing the timing of each policy's news first being made public;
4. Classifying each policy as either cyclically or not cyclically motivated; and
5. Restricting the sample, starting January 1967.

Unlike Fieldhouse, Mertens, and Ravn (2018), I entirely abstract from the retained portfolio activity of Ginnie Mae, as Ginnie's past activity is less relevant to the Fed's balance sheet normalization program and GSE reform. Ginnie's purchase programs were concentrated in a different segment of the mortgage market and largely driven by countercyclical objectives. Before Congress terminated its purchase programs in the early 1980s, Ginnie was actively employed to direct credit toward FHA loans during periods of distress in the 1970s; almost all policy changes affecting its purchases are classified as cyclically motivated by Fieldhouse and Mertens (2017). I also focus exclusively on the pre-crisis January 1967–December 2006 sample, ignoring more recent policy interventions by the Federal Reserve and Treasury, which were cyclically motivated.

Table B.1: Narrative Measures of Policy Changes

Policy Description	Agency	Impact	News	Classification
HUDA 1968: Increased Debt-to-Capital Ratio	FNMA	+$1.39 billion	Oct. 1968	Non-Cyclical
Conforming Mortgage Program Approval	FNMA	+$0.4 billion	Nov. 1971	Non-Cyclical

Policy Description	Agency	Impact	News	Classification
HCDA 1974: Conforming Loan Limit	FNMA	+$1.14 billion	Aug. 1974	Non-Cyclical
HCDA 1974: Conforming Loan Limit	FHLMC	+$0.46 billion	Aug. 1974	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FNMA	+$4.82 billion	Oct. 1977	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FHLMC	+$0.21 billion	Oct. 1977	Non-Cyclical
HCDA 1978: Mortgagee Expansion	FHLMC	+$2.0 billion	Oct. 1978	Non-Cyclical
Increased Debt-to-Capital Ratio	FNMA	+$6.25 billion	Dec. 1982	Non-Cyclical
Second Mortgage Program Approval	FHLMC	+$1.0 billion	Jan. 1986	Non-Cyclical
Decreased Debt-to-Capital Ratio	FNMA	-$2.7 billion	Apr. 1987	Non-Cyclical
Public Listing: Stock Split Capitalization	FHLMC	+$1.62 billion	Nov. 1988	Non-Cyclical
FHEFSSA 1992: Capital Requirements	FNMA	-$4.25 billion	Mar. 1990	Non-Cyclical
Affordable Housing Goals of 1995	FHLMC	+$0.61 billion	Dec. 1995	Non-Cyclical
Affordable Housing Goals of 2004	FNMA	+$7.6 billion	Apr. 2004	Non-Cyclical
Affordable Housing Goals of 2004	FHLMC	+$7.6 billion	Apr. 2004	Non-Cyclical
Accounting Scandal: Capital Surcharge	FNMA	-$141.4 billion	Sep. 2004	Non-Cyclical
Portfolio Growth Limit Imposed	FHLMC	-$42.8 billion	June 2006	Non-Cyclical

Notes on acronyms: Housing and Urban Development Act (HUDA); Housing and Community Development Act (HCDA); and Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA). Source: Fieldhouse and Mertens (2017).

Table B.1 details the regulatory policy events for Fannie and Freddie that I use as identifying variation: the projected dollar effect of each policy change for agency mortgage holdings (in nominal dollars), the timing of each policy's news being made public, and the date each policy took effect for all reg-

ulatory policy events classified as not cyclically motivated in the Fieldhouse and Mertens (2017) narrative analysis. After monthly aggregation, there are 14 months with not cyclically motivated regulatory policy events affecting the retained portfolios of Fannie and Freddie over the January 1967–December 2006 sample. Section B provides a brief, chronological overview of each of these policy changes that I use as instrumental variables, while more detailed explanations of the quantification, timing, and classification of each policy, along with related sources and documentation, can be found in Fieldhouse and Mertens (2017).

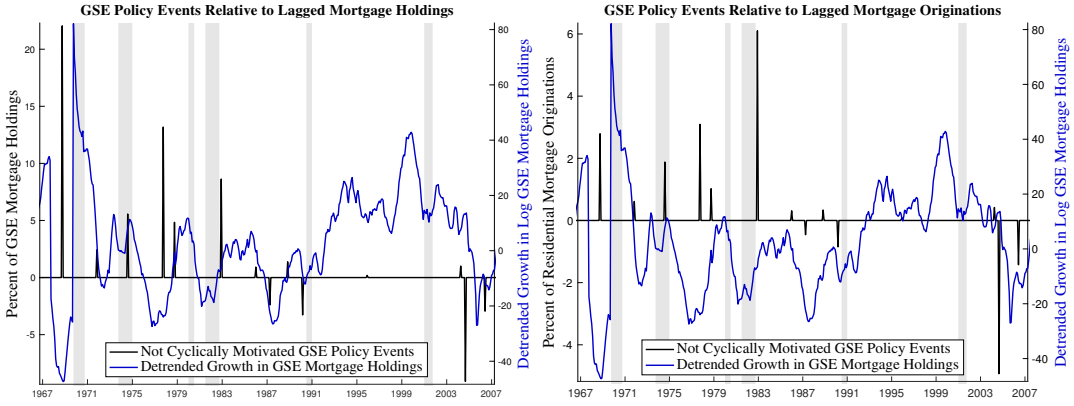

Figure B.3. Non-Cyclically Motivated GSE Policy Events

Notes: Gray bars correspond with NBER recession dates. The not cyclically motivated GSE policy events (black, left axis) are the sum of the quantified policy changes (in current dollars) affecting Fannie Mae and Freddie Mac from the Fieldhouse and Mertens (2017) narrative, scaled to annualized GSE mortgage holdings over the previous year (left panel) and annualized mortgage originations over the previous year (right panel). The cyclical growth in GSE mortgage holdings (blue, right axis) measures the combined mortgage holdings of Fannie and Freddie, deflated using the core PCE prince index, log transformed, and detrended using the linear two-year forecasting error method proposed by Hamilton (forthcoming). Sources: see the data appendix.

Figure B.3 depicts the not cyclically motivated GSE policy events that I use for identification (black), scaled to GSE mortgage holdings over the prior year (left panel) and scaled to annualized mortgage originations over the prior year (right panel). For a sense of scale, GSE purchases averaged just under 10% of

residential mortgage originations over 1967–2006. Figure B.3 also depicts the detrended growth in GSE mortgage holdings (blue), estimating the cyclical component of log real GSE mortgage holdings using the linear forecasting method proposed by Hamilton (forthcoming). The expansionary (contractionary) narrative regulatory events overwhelming line up with periods of relative balance sheet growth (contractions).

Chronological Overview of GSE Policy Events Used for Identification

Housing and Urban Development Act of 1968: The HUD Secretary increased Fannie's debt-to-capital limitation on secondary market borrowing from 15 to 20 times its regulatory capital in October 1968. The Treasury Secretary additionally put in writing that the Treasury would make any loans necessary to guarantee timely payment of interest and principal on Fannie's new debt issues. Collectively, these actions helped Fannie expand faster than had been envisioned by the Housing and Urban Development Act of 1968, which had set a statutory debt-to-capital ratio of 15 times regulatory capital.

Emergency Home Finance Act of 1970: In addition to chartering Freddie Mac to support a secondary market for conventional mortgages originated by thrift banks, the Act expanded Fannie Mae's purchase authority to include conventional mortgages, conditional on the HUD Secretary's approval. Approval was granted shortly after the bill's enactment. Fannie had previously been restricted to purchasing FHA/VA-backed mort-

gages, and the policy change significantly expanded the pool of mortgages it could purchase. The policy change was forward-looking, intended to spur the harmonized development of standardized contracts for conforming mortgages qualifying for sale to the secondary market.

Housing and Community Development Act of 1974: Before indexing the conforming loan limit to a national home price index in 1980, Congress would erratically revise the conforming loan limit in periodic housing authorization bills, which were typically subject to much debate back and forth between the House and Senate. The Act increased the conforming loan limit for conventional mortgages from $33,000 to $55,000, effective upon enactment. The policy change considerably expanded the pool of mortgage debt eligible for purchase by the GSEs in both nominal and real terms, as the previous limit had been fixed nominally since 1969; the CPI rose by 34% between 1969 and 1974, whereas the loan limit was increased 67% by the Act. The bill's objectives were forward-looking, largely related to urban redevelopment, consolidation of housing programs, and resolving a multi-year impasse over all housing legislation; the Nixon Administration was trying to roll back parts of the Great Society legislation, particularly related to housing, to which the Senate objected.

Housing and Community Development Act of 1977: The Act increased the conforming loan limit for conventional mortgages from $55,000 to $75,000, effective upon enactment. The policy change again considerably expanded the pool of mortgage debt eligible for purchase by the GSEs, as the previous limit had been fixed nominally since 1974; the CPI rose by 23% between 1974 and 1977, whereas the loan limit was increased 36% by the Act. The bill was largely intended to reduce discrimination in mort-

gage lending and federal housing policy, and had no discernible countercyclical motive. Shortly thereafter, Congress indexed the conforming loan limit to a national home price index, and it thus ceased to be a source of significant, unanticipated policy variation until the Great Recession.

Housing and Community Development Act of 1978: The Act amended Freddie's charter act to allow it to purchase mortgages from mortgage banks in addition to thrift banks and clarified that Congress did not intend for Fannie and Freddie to be operating in different segments of the housing market, but for both to broadly support the housing market. The amendment significantly expanded the scope for Freddie's secondary market activity and, ahead of passage, was projected to spur an increase in Freddie's near-term purchases. The policy change was intended to clarify prior legislative intent, and had no discernible countercyclical motive.

Increased Debt-to-Capital Ratio: The HUD Secretary increased Fannie's debt-to-capital limit on secondary market borrowing from 25 to 30 times its regulatory capital in December 1982, easing a binding balance sheet constraint and allowing further leveraged portfolio growth. The regulatory loosening was part of a broader pattern of deregulatory efforts to help Fannie and mortgage lenders grow their way back to health without using public funds for bailouts, which presaged the S&L crisis later in the decade. Enhancing profitability and strengthening Fannie's balance sheet was perceived by the Reagan Administration as a necessary prerequisite to privatizing both Fannie and Freddie.

Second Mortgage Program Approval: Congress increasingly came to view second mortgages as an important source of funding for down payments for home purchases in the late 1970s and early 1980s. Fannie had

begun purchasing second mortgages, in part to help rebuild its balance sheet, after HUD authorized Fannie to start dealing in junior lien mortgages in 1981, but Freddie remained prohibited from transacting in junior liens. The Secondary Mortgage Market Enhancement Act of 1984 redefined "mortgage" to encompass second liens and temporarily authorized Freddie to purchase second mortgages, intended to equalize regulatory treatment of the GSEs. Authorizing Freddie to purchase second mortgages considerably expanded the pool of mortgage debt it was allowed to purchase, and Freddie soon announced that it was launching a program of purchasing and securitizing second mortgages.

Decreased Debt-to-Capital Ratio: In April 1987, HUD issued a rule granting Fannie Mae limited approval to enter the new real estate mortgage investment conduit (REMIC) market with issues backed by conventional mortgages. The rule also unexpectedly lowered Fannie Mae's debt-to-capital-ratio from 30-to-1 to 25-to-1, effective immediately, with another pending reduction to 20-to-1 announced for December 31, 1988. Mortgage lenders were concerned about Fannie monopolizing the conventional REMIC market and had been lobbying regulators to bar Fannie from expanding into the market; the Reagan Administration was perceived as taking an alternative tack to rein in Fannie that would move the enterprise more in the direction of privatization.

Public Listing: Stock Split Capitalization: As chartered, Freddie Mac had no means of raising additional capital and had been lobbying regulators for a means to expand its capitalization for nearly a decade. Legislation was in the works to remove trading barriers on Freddie's original preferred stock, a move toward privatizing Freddie and enabling the belea-

guered thrift industry to realize gains on their holdings of FHLMC shares. Ahead of its public listing, Freddie was allowed to tender an exchange and split of original preferred shares for new preferred stock, which came with a mandatory capital contribution per share. The effect of the stock split was a long-sought and sizable injection of working capital for Freddie shortly before being publicly listed. No countercyclical motive was discernible.

Capital Requirements: In the early 1990s the Treasury Department concluded, in a series of high-profile reports, that Fannie Mae was undercapitalized, and the Government Accountability Office reached the same conclusion. As legislation was being drafted that would eventually impose new statutory capital requirements and initiate the development of risk-based capital standards for the GSEs, Fannie raced to preempt regulators and embarked on a politically motivated recapitalization campaign in March 1990, temporarily restraining its balance sheet growth. The subsequently enacted capital requirements imposed by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA) would have been a retroactively binding constraint and Fannie's abrupt recapitalization was clearly prompted by the anticipation of pending capital requirements. The imposition of capital requirements was driven by safety and soundness concerns, intended to avoid the fiscal cost or political backlash from potentially bailing out Fannie Mae.

Affordable Housing Goals of 1995: Freddie Mac had shrunk and then entirely terminated its multifamily mortgage purchase program in 1990 after suffering considerable losses on its multifamily portfolio in the late 1980s. FHEFSSA imposed a variety of quantitative affordable housing

goals for the GSEs' purchases, much of which were designed to be easily achievable in the early years. Freddie, however, widely missed its multifamily mortgage affordable housing subgoals for 1993–1994 after being forced to reinstate its multifamily operations in 1993. In December 1995, HUD announced a sizable increase in multifamily purchase requirements for 1996–1999, which materially affected Freddie's purchase volumes. The multifamily affordable housing subgoals were motivated by long-term social policy objectives related to housing affordability.

Affordable Housing Goals of 2004: The GSEs' affordable housing goals came up for renewal in 2004 and were considerably increased for 2005–2008 as part of a broader effort by the Bush Administration to promote homeownership, particularly for minorities. The new qualifying mortgage purchase requirements were much harder to meet than earlier goals, which were not classified as binding constraints for retained portfolio activity, and appeared to have affected the GSEs' purchase volumes. The changes were motivated by long-term social policy objectives related to housing affordability.

Accounting Scandal: Capital Surcharge: Accounting scandals surfaced at Freddie Mac in 2003, prompting increased oversight of both GSEs. Graver accounting irregularities were subsequently found at Fannie, which abruptly prompted a $9 billion downward revision in Fannie's regulatory capital in September 2004; the shortfall was the result of disallowed accounting practices regarding hedging and amortization of deferred charges, and Fannie was found to have been deferring amortization expenses to inflate earnings per share and maximize related executive bonuses. Fannie's regulator imposed capital surcharges that required

a $12.5 billion capital shortfall to be closed within one year, prompting both recapitalization efforts and a sizable reduction in Fannie's retained portfolio. The accounting scandals broke the considerable lobbying clout of Fannie and Freddie, and OFHEO, in an effort at reputation management, increased its regulatory oversight of the GSEs. The Treasury Department and Greenspan Fed had been pushing regulators to reduce the GSEs' mortgage holdings, and the accounting scandals provided pretext to do just that. No countercyclical motive was discernible.

Portfolio Growth Limit Imposed: Coinciding with the release of the final report into Fannie's accounting scandal in May 2006, federal regulators capped the size of Fannie's retained portfolio at its level as of December, 31 2005; Fannie's portfolio did not, however, appear counterfactually poised for considerable growth in the absence of the limits, the imposition of which did not faze investors. Regulatory pressure then unexpectedly bore down on Freddie Mac, which entered an agreement in August 2006 to cap the growth of its portfolio to 2% annually. Freddie, however, had been rapidly growing and exploiting Fannie's accounting scandal woes to gain market share, so the unanticipated portfolio limit significantly constrained Freddie's retained portfolio activity.

See Fieldhouse and Mertens (2017) for sources and discussion regarding classification of policy motives, the determination of policies' news being made public, and quantification.

Additional Results on Instrument Relevance and Validity

Figure B.4 depicts the response of GSE mortgage holdings to a one-dollar increase in GSE net portfolio purchases, estimated as in equation (2.2) using the not cyclical GSE policy events. GSE retained mortgage holdings see a significant rise shortly following news shocks about pending regulatory changes, increasing roughly 80 cents per dollar of cumulated purchases after six months. The expansion gradually declines thereafter, but remains statistically significant at conventional levels. The significant response of GSE mortgage holdings to the regulatory policy shocks is further evidence of instrument relevance. The gradual decline in the GSEs' mortgage holdings is likely driven by a combination of accelerated repayment of existing holdings, pooling mortgage holdings and selling off MBS to third parties, or reaching new balance sheet constraints.

To test the lag exogeneity requirement, I estimate equation (2.2) as a single-stage LP-OLS regression to obtain fitted values of the error terms, $\widehat{u_t^{\perp}}$, that have been orthogonalized to the set of lagged controls. Figure B.5 plots the correlation of the narrative instrument (scaled to trend real personal income) with lagged error terms $\widehat{u_{t-j}^{\perp}}$ for $j \in \{1,\ 2,\ ...,\ 12\}$, along with 95% confidence intervals. Correlations with lagged error terms are calculated for regressions measuring the response of GSE mortgage holdings (left panel) and total residential mortgage debt (right panel) to actual GSE purchases. In both cases, I fail to reject the null hypothesis that the narrative instrument is uncorrelated with lagged structural shocks after conditioning on the lagged controls. The results are broadly robust to estimating the correlation of the GSE regulatory events and lagged regression residuals calculated using various left-hand-side variables of interest.

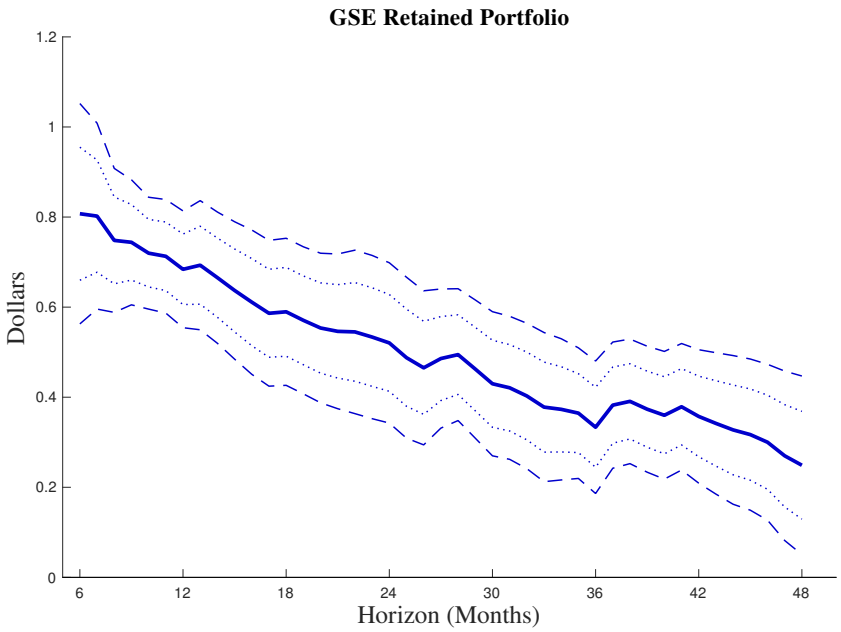

Figure B.4. Instrument Relevance: GSE Retained Mortgage Holdings

Notes: GSE retained portfolio mortgage holdings measure the balance sheet holdings of Fannie Mae and Freddie Mac, excluding off-balance-sheet guaranteed MBS held by third parties, while non-GSE mortgage holdings measure all other residential mortgage debt. Data have been seasonally adjusted using the Census Bureau's X-13 program. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: see the data appendix.

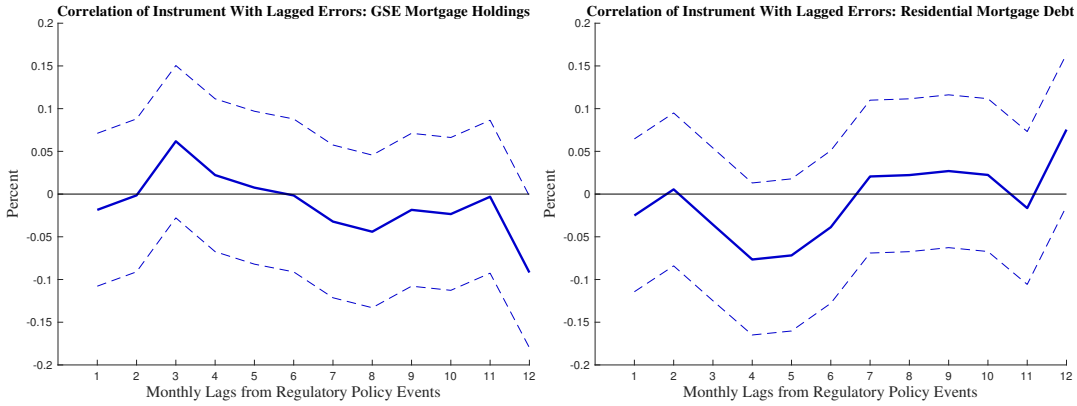

Figure B.5. Lag Exogeneity Diagnostics

Notes: The GSE regulatory events are scaled to trend real personal income. Lagged regression residuals are fitted by estimating equation (2.2) as a single-stage LP-OLS regression measuring the response of GSE mortgage holdings (left panel) and total residential mortgage debt (right panel) to actual GSE purchases. Dashed lines are 95% confidence intervals. Sample: January 1967–December 2006. Sources: see the data appendix.

Appendix B2: Additional Results, Robustness Checks, and Extensions

Private Lending Reallocations by Sector

Section 2.4.1 estimates the aggregate responses of private mortgage lending by borrower-type to GSE purchase shocks. I document that GSE purchases crowd in private mortgage lending for single-family homes while simultaneously crowding out private lending for multifamily and commercial mortgages. The transmission of GSE purchase shocks appears to induce such a reallocation of credit in part through a mortgage origination channel, as suggested by the analysis of mortgage transaction flows in Section 2.4.2. To the extent that financial institutions originating loans retain loans on balance sheet, crowd-out effects for lending volumes likely vary across financial sectors, depending on the degree of origination activity and exposure to GSE demand for mortgage originations. There is considerable heterogeneity across the origination and lending activity of the major sectors of the primary mortgage market, often due to regulatory limits on asset holdings.[10] Crowd out of nonresidential lending might be expected to be particularly discernible on the balance sheets of financial institutions with a large market share of residential mortgage originations that also

[10]Thrift banks (savings and loan associations, mutual savings banks, and credit unions) were legally required to dedicate at least 65% of their assets to mortgage lending to be eligible for FHLBank membership. While savings and loan associations have largely been confined to making residential mortgage loans and investing in government securities, reforms in the early 1980s granted increasing (albeit limited) scope to make consumer, commercial mortgage, and other commercial loans. Commercial banks have a broader loan portfolio spanning residential and commercial mortgage lending, C&I loans, consumer loans, and an array of securities. On the far end of the spectrum, mortgage companies (mortgage banks or brokers) are nondepository institutions that are reliant on wholesale funding and only originate and service mortgage loans.

originate nonresidential loans—notably commercial banks, thrift banks, mortgage companies, and credit unions.

Figure B.6 depicts the response of private holdings of whole mortgages by sector to a one-dollar increase in GSE purchases, estimated by 2SLS as in equation (2.2) using the not cyclically motivated policy events. The top panel documents the mortgage lending responses of all depository institutions (commercial banks and thrifts) to GSE purchase shocks. The top-left panel of Figure B.6 shows that depository institutions' holdings of whole home mortgages respond quite similarly to that of the private sector at large; holdings jump roughly 40 cents at horizons of roughly six months and later see a sustained increase of up to 25 cents on the dollar at horizons above two years, which is broadly significant at the 68% or 90% confidence level. In the top-middle panel, depository institutions' holdings of multifamily mortgages see a significant and persistent decline at horizons above 10 months following GSE purchase shocks, with point estimates around five cents on the dollar. In the top-right panel, depository institutions' commercial mortgage holdings also exhibit a rather persistent decline of 10 to 15 cents per dollar of GSE purchases at horizons above one year, albeit only broadly significant at the 68% confidence level. Much of the aggregate crowd-in and crowd-out effects of GSE purchase shocks for private mortgage lending appears to be driven by the lending behavior of depository institutions, including the near-term home mortgage warehousing behavior depicted in Figure 2.3.

The middle panel of Figure B.6 depicts the mortgage lending response of life insurance companies to GSE purchase shocks. Life insurance companies hold a broadly diversified asset portfolio, including significant holdings of multifamily

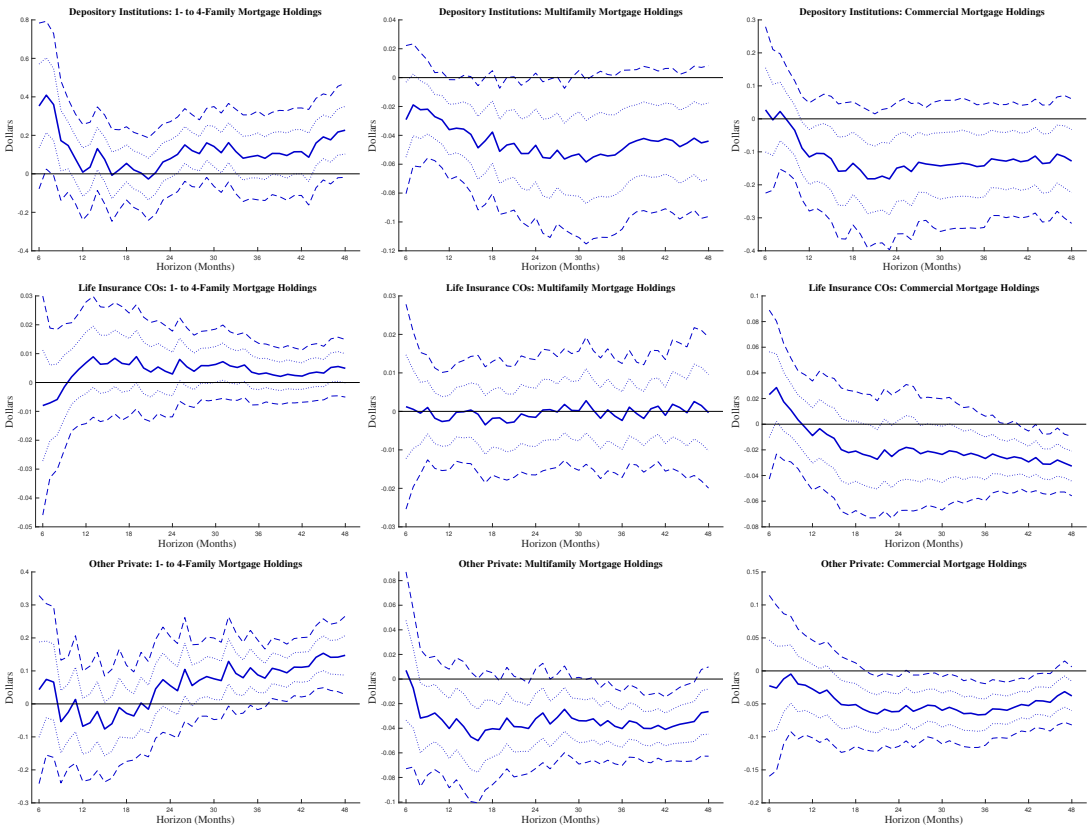

Figure B.6. Private Direct Mortgage Holdings by Sector

Notes: Depository institutions include commercial banks, savings banks, and savings and loan associations. Other private entities include mortgage companies, credit unions, real estate investment trusts, state and local credit agencies, state and local retirement funds, noninsured pension funds, finance companies, and individuals. Direct mortgage holdings exclude holdings of mortgage pools. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Data is seasonally adjusted using the Census Bureau's X-13 program. Sources: See the data appendix.

and commercial mortgage debt, but play a marginal role in originating mortgages. The response of life insurers' home mortgage holdings is quite muted and only marginally significant, as depicted in the middle-left panel of Figure B.6. The point estimates for holdings of multifamily mortgages in the middle panel are negligible and not statistically different than zero. The response of life insurance companies' commercial mortgage holdings is again small and only marginally significant for most of the horizon, as seen in the middle-right panel. The muted response of life insurers' mortgage holdings juxtaposed with that of

depository institutions supports the transmission of GSE purchases through a mortgage origination channel: portfolio rebalancing effects are concentrated in sectors originating mortgages.

The bottom row of Figure B.6 depicts the mortgage lending response of other non-depository private entities, which include mortgage companies, credit unions, real estate investment trusts, state and local retirement funds, pension funds, finance companies, and individuals.[11] As depicted in the bottom-left panel, the home mortgage holdings of these other private entities see a steady, significant response to GSE purchase shocks only after two years. Unlike depository institutions, there is no early spike in home mortgage loans being warehoused for an extended period before being sold off to the secondary market. The medium-term increase in home mortgage lending by sectors originating and holding home mortgages is again consistent with GSE purchases inducing lagged expansions in new housing investment and new home purchases, as documented in Section 2.5 and Appendix Section B, respectively. The bottom-middle and bottom-right panels depict declines in other private entities' multifamily and commercial mortgage holdings, respectively; the declines in lending are smaller but qualitatively similar to those of depository institutions, and significant for much of the impulse response horizon. As with the lending responses of depository institutions, the lending responses of other private entities provides evidence of GSE purchase shocks crowding out multifamily and commercial lending and crowding in home mortgage lending, particularly at horizons exceeding two years.

The disparate responses of mortgage lending to GSE purchase shocks across

[11] Mortgage companies originate both residential mortgages and commercial real estate loans, which are passed on to the secondary mortgage market shortly after origination. Credit unions play a significant role in originating home mortgages that are not sold to the secondary market.

sectors of the primary mortgage market provides further evidence of the transmission of purchases operating through a mortgage origination channel: crowd-out effects are concentrated in industries that originate mortgages, particularly depository institutions with the option of retaining new mortgage originations or selling them to the secondary market.

Domestic vs. International Funding of Agency Debt and U.S. Mortgage Lending

The transmission of GSE purchase shocks through a safe asset supply channel might be dampened if foreign institutional investors absorb a significant share of the accompanying new agency securities issues, as depicted in Figure 2.5. Fannie and Freddie began aggressively marketing agency bond and MBS issues to foreign institutional investors in the 1990s, and foreign holdings have accounted for roughly 10–15% of agency securities outstanding in recent years.[12] If government agency securities and loans to U.S. banks are imperfect substitutes for foreign investors, international demand for agency securities would dampen the effect of GSE issues competing with domestic banks for wholesale funding and related portfolio rebalancing effects. More broadly, foreign funding of the subsidized expansion in U.S. mortgage lending would reduce the scope for credit spillovers among domestic lenders, to the extent bank lending is constrained by domestic savings.

Figure B.7 depicts the response of net foreign purchases of long-term agency

[12]The underlying Treasury International Capital System data series on net foreign purchases of agency securities include agency bonds and MBS; separate series for asset-backed securities (ABS) and non-ABS are not available before 2011.

Figure B.7. Foreign Net Purchases of Agency Securities Associated with GSE Purchase Shocks

Notes: Agency bonds and securities include mortgage-backed securities. Foreign official holdings include those of central banks, sovereign wealth funds, and multinational organizations. Net purchases exclude principal payments distributed to holders prior to redemption. Foreign net purchases data are not seasonally adjusted. Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: U.S. Department of the Treasury, Treasury International Capital System. Sample: May 1978–December 2006.

bonds and MBS to a one-dollar regulatory shock to GSE purchases, estimated by 2SLS as in regression (2.2).[13] The left panel shows that cumulated purchases of agency securities by foreign private entities quickly rise by nearly 25 cents per dollar of GSE purchases and persistently rise 10 to 20 cents for horizons above one year; this increase in foreign purchases of agency debt is broadly statistically significant at conventional levels for the entire impulse response horizon. Cumulated agency securities purchases of foreign official institutions see a small decline of roughly 5 cents per dollar in GSE purchases, which is only marginally significant (not depicted).[14] On net, a one-dollar shock to GSE mortgage purchases induces a decline in total foreign net purchases of agency securities of roughly 10 to 20 cents, as depicted in the right panel of Figure B.7. The un-

[13]Flows of foreign purchase of agency securities, f_t, are cumulated such that $y_{t+h} - y_{t-1} = \sum_{j=0}^{h} f_{t+j}$. The sample is limited to May 1978–December 2006 based on data availability, and the controls for unemployment and personal income growth are dropped to conserve on the number of parameters estimated.

[14]Foreign official holdings include those of central banks, sovereign wealth funds, and multinational organizations.

derlying Treasury International Capital System data on net purchases exclude principal repayments prior to securities' redemption, so the impulse response for cumulated net purchases are an upper bound for the response of foreign holdings of agency securities in levels. The evidence on international capital flows suggests that most of the subsidized expansion in U.S. mortgage lending driven by GSE regulatory shocks is being financed by domestic savings, with foreign purchases of agency securities accounting for at most 15-20% of the rise in residential mortgage debt outstanding. Foreign purchases of agency securities do not appear to be significantly dampening a safe asset supply channel of U.S. housing credit policy for domestic lending.

Additional Robustness Checks: Credit and Construction Multipliers

Tables B.2 and B.3 analyze the role of instrumentation and the set of lagged controls for the headline lending and construction results, respectively. Columns [1] and [2] present the 2SLS and OLS estimates of the credit and construction multipliers with the benchmark set of lagged controls, as reported in Sections 2.4 and 2.5. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. The near-term increase in private-sector home mortgage lending and decrease in C&I lending documented in the 2SLS estimates does not register in the OLS estimates, but the OLS point estimates otherwise generally follow a similar pattern to the 2SLS estimates.[15] The short-run LP-OLS estimates would

[15]Another notable divergence between 2SLS and OLS estimates arises in the response of agency debt outstanding to GSE purchases; the near-term spike in agency debt outstanding and gradual reversion, as depicted in Figure 2.5, does not register in the OLS estimates, which are persistently flat (not reported).

Table B.2: Credit Multipliers: Relevance of Instrumentation and Controls

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Private Home Mortgage Holdings	6	0.41**	0.09*	0.55***	0.14*	0.58*	−0.02	0.34**	0.09*
		(−0.06, 0.88)	(−0.08, 0.26)	(0.10, 0.99)	(−0.05, 0.32)	(−0.29, 1.44)	(−0.18, 0.15)	(−0.05, 0.74)	(−0.06, 0.25)
	12	0.01	0.01	0.10	−0.00	0.22	−0.08	−0.05	−0.03
		(−0.25, 0.26)	(−0.15, 0.17)	(−0.21, 0.41)	(−0.18, 0.17)	(−0.49, 0.93)	(−0.27, 0.12)	(−0.32, 0.21)	(−0.19, 0.13)
	18	0.11*	0.01	0.18*	−0.01	0.41	−0.06	0.06	−0.03
		(−0.10, 0.31)	(−0.10, 0.12)	(−0.11, 0.48)	(−0.13, 0.12)	(−0.45, 1.27)	(−0.23, 0.10)	(−0.17, 0.30)	(−0.14, 0.08)
	24	0.23***	0.15***	0.36***	0.10**	0.65*	0.02	0.18*	0.09***
		(0.05, 0.41)	(0.07, 0.23)	(0.04, 0.68)	(−0.01, 0.20)	(−0.49, 1.78)	(−0.16, 0.19)	(−0.05, 0.41)	(0.00, 0.18)
	36	0.28***	0.38***	0.44***	0.26***	0.94*	0.12	0.25***	0.32***
		(0.07, 0.50)	(0.27, 0.49)	(0.12, 0.76)	(0.13, 0.39)	(−0.62, 2.50)	(−0.12, 0.36)	(0.03, 0.47)	(0.20, 0.43)
	48	0.48***	0.55***	0.68***	0.38***	1.20*	0.08	0.46***	0.50***
		(0.17, 0.78)	(0.43, 0.66)	(0.25, 1.11)	(0.22, 0.54)	(−0.97, 3.37)	(−0.20, 0.36)	(0.16, 0.75)	(0.38, 0.62)
Private Multifamily Mortgage Holdings	6	−0.02	−0.01	−0.00	−0.01	0.01	−0.02*	0.00	−0.00
		(−0.14, 0.09)	(−0.04, 0.02)	(−0.09, 0.09)	(−0.04, 0.02)	(−0.11, 0.13)	(−0.05, 0.01)	(−0.10, 0.10)	(−0.03, 0.02)
	12	−0.07**	−0.05***	−0.04*	−0.03**	−0.02	−0.03*	−0.05*	−0.03**
		(−0.15, 0.01)	(−0.08, −0.02)	(−0.11, 0.02)	(−0.06, 0.00)	(−0.10, 0.06)	(−0.07, 0.01)	(−0.12, 0.02)	(−0.06, 0.00)
	18	−0.07*	−0.06***	−0.04	−0.03*	0.01	−0.03**	−0.04	−0.04***
		(−0.17, 0.03)	(−0.09, −0.03)	(−0.13, 0.05)	(−0.06, 0.01)	(−0.07, 0.09)	(−0.06, 0.00)	(−0.14, 0.06)	(−0.07, −0.01)
	24	−0.07*	−0.06***	−0.03	−0.03*	0.02	−0.04***	−0.04	−0.04***
		(−0.18, 0.04)	(−0.10, −0.03)	(−0.15, 0.08)	(−0.07, 0.01)	(−0.07, 0.11)	(−0.07, −0.00)	(−0.16, 0.08)	(−0.08, −0.01)
	36	−0.08*	−0.08***	−0.05	−0.04***	0.02	−0.03*	−0.06*	−0.06***
		(−0.18, 0.02)	(−0.11, −0.04)	(−0.18, 0.08)	(−0.08, −0.00)	(−0.07, 0.12)	(−0.08, 0.01)	(−0.18, 0.06)	(−0.10, −0.02)
	48	−0.07*	−0.10***	−0.03	−0.06***	0.04	−0.04*	−0.06	−0.09***
		(−0.18, 0.04)	(−0.14, −0.06)	(−0.16, 0.11)	(−0.10, −0.02)	(−0.06, 0.14)	(−0.09, 0.01)	(−0.18, 0.06)	(−0.13, −0.05)
Private Commercial Mortgage Holdings	6	−0.03	−0.04	0.11	−0.01	−0.04	−0.03	−0.02	−0.04*
		(−0.36, 0.30)	(−0.11, 0.04)	(−0.11, 0.34)	(−0.09, 0.07)	(−0.29, 0.21)	(−0.09, 0.03)	(−0.27, 0.22)	(−0.10, 0.03)
	12	−0.15**	−0.11***	−0.05	−0.05*	−0.13*	−0.06***	−0.11*	−0.11***
		(−0.32, 0.02)	(−0.16, −0.05)	(−0.17, 0.08)	(−0.12, 0.01)	(−0.30, 0.03)	(−0.12, −0.01)	(−0.27, 0.04)	(−0.16, −0.06)
	18	−0.19***	−0.12***	−0.09*	−0.09***	−0.15*	−0.07***	−0.14**	−0.10***
		(−0.36, −0.01)	(−0.17, −0.06)	(−0.22, 0.03)	(−0.14, −0.03)	(−0.35, 0.05)	(−0.12, −0.03)	(−0.29, 0.01)	(−0.15, −0.06)
	24	−0.22***	−0.13***	−0.12*	−0.10***	−0.19*	−0.08***	−0.16**	−0.10***
		(−0.41, −0.02)	(−0.19, −0.07)	(−0.27, 0.03)	(−0.16, −0.05)	(−0.43, 0.05)	(−0.12, −0.03)	(−0.34, 0.02)	(−0.15, −0.05)
	36	−0.24***	−0.15***	−0.13*	−0.09***	−0.18*	−0.07***	−0.19***	−0.13***
		(−0.44, −0.04)	(−0.22, −0.08)	(−0.30, 0.04)	(−0.15, −0.02)	(−0.44, 0.08)	(−0.11, −0.02)	(−0.38, −0.01)	(−0.19, −0.07)
	48	−0.21***	−0.19***	−0.08	−0.07**	−0.13**	−0.09***	−0.15**	−0.14***
		(−0.39, −0.04)	(−0.25, −0.12)	(−0.25, 0.09)	(−0.13, 0.00)	(−0.29, 0.02)	(−0.13, −0.05)	(−0.32, 0.02)	(−0.20, −0.09)
Commercial and Industrial Loans	6	−0.33**	−0.04	−0.15	−0.01	−0.13	−0.05*	−0.27*	−0.03
		(−0.71, 0.05)	(−0.13, 0.04)	(−0.48, 0.19)	(−0.11, 0.08)	(−0.41, 0.15)	(−0.14, 0.04)	(−0.60, 0.07)	(−0.12, 0.05)
	12	−0.21***	−0.11***	−0.15**	−0.07*	−0.20***	−0.10**	−0.19***	−0.12***
		(−0.40, −0.03)	(−0.21, −0.01)	(−0.33, 0.02)	(−0.16, 0.02)	(−0.37, −0.03)	(−0.20, 0.00)	(−0.37, −0.01)	(−0.22, −0.02)
	18	−0.21***	−0.13***	−0.19***	−0.10***	−0.21***	−0.12***	−0.22***	−0.15***
		(−0.41, −0.02)	(−0.23, −0.04)	(−0.36, −0.02)	(−0.18, −0.02)	(−0.39, −0.04)	(−0.20, −0.04)	(−0.41, −0.03)	(−0.24, −0.05)
	24	−0.17**	−0.15***	−0.14**	−0.12***	−0.19***	−0.13***	−0.14**	−0.16***
		(−0.34, 0.01)	(−0.23, −0.06)	(−0.31, 0.02)	(−0.20, −0.04)	(−0.36, −0.03)	(−0.20, −0.07)	(−0.31, 0.03)	(−0.25, −0.08)
	36	−0.14***	−0.12***	−0.11*	−0.09***	−0.11*	−0.13***	−0.11*	−0.13***
		(−0.26, −0.01)	(−0.19, −0.06)	(−0.26, 0.05)	(−0.17, −0.02)	(−0.28, 0.06)	(−0.17, −0.08)	(−0.23, 0.02)	(−0.20, −0.06)
	48	−0.14**	−0.07***	−0.13**	−0.05*	−0.06	−0.16***	−0.11*	−0.08***
		(−0.27, 0.00)	(−0.13, −0.02)	(−0.28, 0.01)	(−0.11, 0.02)	(−0.34, 0.23)	(−0.20, −0.11)	(−0.25, 0.03)	(−0.14, −0.02)
Regression framework:		2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS
Interest rate controls:		Yes	Yes	No	No	Yes	Yes	Yes	Yes
Housing controls:		Yes	Yes	Yes	Yes	No	No	Yes	Yes
Cyclical controls:		Yes	Yes	Yes	Yes	Yes	Yes	No	No

Notes: Point estimates measure the cumulative dollar response of lending volumes per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006.

Table B.3: Cumulative Construction Multipliers: Relevance of Instrumentation and Controls

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Single-Family Home Construction	6	0.01	−0.01*	0.01	−0.01	0.03	−0.01	−0.01	−0.01*
		(−0.07, 0.08)	(−0.03, 0.01)	(−0.07, 0.09)	(−0.02, 0.01)	(−0.05, 0.11)	(−0.03, 0.01)	(−0.08, 0.06)	(−0.03, 0.00)
	12	0.02	−0.00	0.02	−0.01	0.04	0.00	0.00	−0.01
		(−0.06, 0.10)	(−0.03, 0.03)	(−0.07, 0.11)	(−0.03, 0.02)	(−0.05, 0.13)	(−0.03, 0.03)	(−0.08, 0.08)	(−0.04, 0.02)
	18	0.02	0.02*	0.01	0.00	0.05	0.02	0.01	0.01
		(−0.06, 0.11)	(−0.02, 0.06)	(−0.09, 0.12)	(−0.03, 0.03)	(−0.06, 0.15)	(−0.02, 0.05)	(−0.09, 0.10)	(−0.03, 0.05)
	24	0.03	0.04***	0.02	0.01	0.07*	0.03**	0.02	0.04**
		(−0.05, 0.12)	(0.01, 0.08)	(−0.09, 0.13)	(−0.03, 0.05)	(−0.06, 0.20)	(−0.01, 0.07)	(−0.08, 0.12)	(−0.00, 0.07)
	36	0.08**	0.12***	0.06*	0.06***	0.14*	0.08***	0.07*	0.11***
		(−0.01, 0.16)	(0.09, 0.15)	(−0.04, 0.16)	(0.02, 0.09)	(−0.03, 0.30)	(0.04, 0.12)	(−0.02, 0.16)	(0.08, 0.15)
	48	0.18***	0.20***	0.16***	0.13***	0.23**	0.12***	0.18***	0.20***
		(0.09, 0.27)	(0.16, 0.24)	(0.05, 0.27)	(0.08, 0.17)	(−0.00, 0.47)	(0.07, 0.16)	(0.08, 0.27)	(0.15, 0.24)
Construction Excl. Single-Family	6	−0.07*	−0.01	−0.10**	−0.01*	−0.03	−0.01	−0.05	−0.01
		(−0.19, 0.06)	(−0.04, 0.02)	(−0.21, 0.01)	(−0.04, 0.01)	(−0.15, 0.09)	(−0.04, 0.02)	(−0.16, 0.05)	(−0.04, 0.03)
	12	−0.06*	−0.04***	−0.08**	−0.04***	−0.02	−0.04***	−0.05*	−0.05***
		(−0.18, 0.05)	(−0.07, −0.01)	(−0.17, 0.01)	(−0.06, −0.02)	(−0.15, 0.10)	(−0.07, −0.01)	(−0.16, 0.05)	(−0.08, −0.01)
	18	−0.09*	−0.06***	−0.11*	−0.05***	−0.04	−0.05***	−0.08*	−0.07***
		(−0.25, 0.07)	(−0.10, −0.02)	(−0.24, 0.03)	(−0.09, −0.02)	(−0.19, 0.12)	(−0.10, −0.01)	(−0.22, 0.07)	(−0.11, −0.04)
	24	−0.11*	−0.09***	−0.13*	−0.08***	−0.03	−0.07***	−0.10*	−0.10***
		(−0.31, 0.09)	(−0.15, −0.04)	(−0.32, 0.05)	(−0.12, −0.04)	(−0.23, 0.17)	(−0.13, −0.01)	(−0.29, 0.09)	(−0.15, −0.05)
	36	−0.18*	−0.15***	−0.17*	−0.12***	−0.03	−0.09**	−0.16*	−0.15***
		(−0.42, 0.07)	(−0.22, −0.08)	(−0.41, 0.06)	(−0.19, −0.05)	(−0.27, 0.21)	(−0.18, 0.00)	(−0.39, 0.07)	(−0.23, −0.08)
	48	−0.23**	−0.18***	−0.20*	−0.16***	0.00	−0.07*	−0.20**	−0.19***
		(−0.49, 0.03)	(−0.28, −0.09)	(−0.45, 0.05)	(−0.24, −0.08)	(−0.27, 0.28)	(−0.19, 0.04)	(−0.44, 0.04)	(−0.28, −0.10)
Total Construction	6	−0.05	−0.02*	−0.09*	−0.03**	0.04	−0.02	−0.05	−0.02*
		(−0.19, 0.10)	(−0.07, 0.02)	(−0.22, 0.05)	(−0.07, 0.00)	(−0.15, 0.22)	(−0.06, 0.02)	(−0.18, 0.07)	(−0.07, 0.02)
	12	−0.04	−0.05***	−0.06	−0.06***	0.05	−0.05*	−0.05	−0.06***
		(−0.15, 0.08)	(−0.10, −0.00)	(−0.19, 0.06)	(−0.10, −0.02)	(−0.15, 0.24)	(−0.10, 0.01)	(−0.16, 0.05)	(−0.12, −0.01)
	18	−0.05	−0.05**	−0.08*	−0.06***	0.06	−0.06**	−0.07	−0.07***
		(−0.20, 0.11)	(−0.11, 0.00)	(−0.24, 0.07)	(−0.11, −0.01)	(−0.18, 0.29)	(−0.13, 0.01)	(−0.21, 0.07)	(−0.13, −0.01)
	24	−0.05	−0.06*	−0.09*	−0.07***	0.10	−0.08**	−0.07	−0.08***
		(−0.23, 0.13)	(−0.12, 0.01)	(−0.26, 0.08)	(−0.13, −0.00)	(−0.21, 0.40)	(−0.17, 0.01)	(−0.24, 0.10)	(−0.15, −0.00)
	36	−0.06	−0.02	−0.06	−0.04	0.18	−0.06	−0.06	−0.04*
		(−0.26, 0.14)	(−0.10, 0.06)	(−0.24, 0.11)	(−0.13, 0.04)	(−0.29, 0.64)	(−0.19, 0.07)	(−0.25, 0.14)	(−0.12, 0.03)
	48	0.02	0.06*	0.03	0.02	0.32	0.00	0.03	0.03
		(−0.18, 0.23)	(−0.02, 0.14)	(−0.15, 0.21)	(−0.07, 0.11)	(−0.36, 1.01)	(−0.17, 0.17)	(−0.16, 0.22)	(−0.06, 0.11)
Regression framework:		2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS
Interest rate controls:		Yes	Yes	No	No	Yes	Yes	Yes	Yes
Housing controls:		Yes	Yes	Yes	Yes	No	No	Yes	Yes
Cyclical controls:		Yes	Yes	Yes	Yes	Yes	Yes	No	No

Notes: Point estimates measure the cumulative dollar response of construction expenditures per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006.

be biased downward if the GSEs' counter-cyclical public mission or profit motives induced an expansion of portfolio purchases in response to decreased pri-

vate home mortgage lending. Reverse causality bias running from home mortgage lending to GSE purchases appears to be a significant cause for concern in the short run, but less so for horizons above one year. Moreover, the results suggest that reverse causality bias is more of a concern when estimating the response of variables endogenously related to GSE profit motives. Instrumentation appears to make relatively little difference for the construction multipliers.

Similarities between 2SLS estimates and OLS estimates, however, hinge on using the identical set of lagged controls; as the set of lagged controls is pared back, the OLS estimates begin diverging from the 2SLS estimates for certain dependent variables. Columns [3] and [4] report the 2SLS and OLS point estimates when the lagged interest rate controls are dropped. The 2SLS point estimates are largely unaffected, but the precision of the lending responses decreases without the interest controls, as would be expected. Crowd-out effects are not driven by conditioning lending or construction on borrowing rates and lending risk spreads. Columns [5] and [6] report the 2SLS and OLS point estimates when the lagged housing market and price controls are instead dropped. Dropping controls for housing activity kills the response of multifamily mortgage lending and, relatedly, construction spending excluding single-family homes, while significantly increasing the estimated expansion in home mortgage lending and related construction. Significant differences emerge across 2SLS and OLS estimates of home and multifamily mortgage lending responses to GSE purchases when the lagged housing and price controls are removed. Conversely, the response of commercial mortgage lending and C&I lending to GSE purchase shocks is largely unaffected by the addition of housing market controls. Columns [7] and [8] report the 2SLS and OLS point estimates when the lagged cyclical controls are instead dropped. Reassuringly, adding the cyclical con-

trols leaves the 2SLS point estimates largely unchanged and merely increases precision in the benchmark specification; concerns about policy endogeneity and misclassification might arise if adding controls for the unemployment rate markedly changed the results.

Tables B.4 and B.5 document that the credit and construction multipliers are robust to additionally controlling for possible interaction effects with other areas of policy affecting banking lending, mortgage borrowing, and construction activity.[16] As a baseline for comparison, column [1] replicates the point estimates from the benchmark impulse responses reported in Sections 2.4 and 2.5. The benchmark sample witnessed considerable deregulation of the commercial bank and thrift industry, the timing of which was largely governed at the state level. Columns [2] and [3] show that the results are robust to controlling for diffusion indices of interstate and interstate bank branching deregulation, respectively; I construct the indices from the deregulation dates documented by Mian, Sufi and Verner (2017), see the data appendix for details. The effect of federal housing credit policies may also depend on interactions with federal tax policy, particularly as relates to the deductibility of home mortgage debt. Column [4] shows that the results are robust to controlling for the dollar value of home mortgage interest deducted from federal personal income taxes as a share of real disposable income.[17] The value of federal tax subsidies for home mortgage borrowing depends on marginal tax rates. Columns [5], [6], and [7] document that the headline results are robust to controlling for average marginal tax rates for the top 1%, top 10%, and bottom 90%, respectively, as calculated by

[16]Lagged controls for personal income growth are dropped when rotating in 12 lags of any additional control variables.

[17]The data are constructed from the Office of Management and Budget's estimates of revenue losses from tax expenditures in various issues of the President's Budget; see the data appendix for details.

Table B.4: Cumulative Credit Multipliers: Policy Interaction Robustness Checks

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Private Home Mortgage Holdings	6	0.41**	0.38*	0.35*	0.29	0.32*	0.30*	0.30*	0.36*
		(−0.06, 0.88)	(−0.13, 0.88)	(−0.23, 0.93)	(−0.31, 0.89)	(−0.15, 0.80)	(−0.16, 0.77)	(−0.16, 0.77)	(−0.10, 0.82)
	12	0.01	−0.01	−0.06	−0.11	0.01	0.00	0.00	−0.01
		(−0.25, 0.26)	(−0.31, 0.28)	(−0.38, 0.26)	(−0.41, 0.19)	(−0.28, 0.29)	(−0.28, 0.28)	(−0.28, 0.28)	(−0.27, 0.25)
	18	0.11*	0.12	0.13	0.10	0.14*	0.13*	0.13*	0.09
		(−0.10, 0.31)	(−0.13, 0.38)	(−0.19, 0.45)	(−0.18, 0.39)	(−0.12, 0.40)	(−0.12, 0.38)	(−0.12, 0.38)	(−0.13, 0.31)
	24	0.23***	0.24***	0.30**	0.26**	0.29***	0.29***	0.29***	0.20**
		(0.05, 0.41)	(0.01, 0.47)	(−0.03, 0.63)	(−0.03, 0.56)	(0.03, 0.54)	(0.06, 0.52)	(0.06, 0.52)	(−0.00, 0.41)
	36	0.28***	0.26***	0.38***	0.40***	0.29***	0.29***	0.29***	0.24***
		(0.07, 0.50)	(0.01, 0.51)	(0.05, 0.71)	(0.07, 0.73)	(0.06, 0.51)	(0.08, 0.50)	(0.08, 0.50)	(0.02, 0.47)
	48	0.48***	0.42***	0.50***	0.57***	0.39***	0.39***	0.39***	0.43***
		(0.17, 0.78)	(0.11, 0.73)	(0.02, 0.97)	(0.08, 1.06)	(0.08, 0.70)	(0.10, 0.69)	(0.10, 0.69)	(0.15, 0.71)
Private Multifamily Mortgage Holdings	6	−0.02	0.03	0.03	−0.01	−0.02	−0.02	−0.02	−0.02
		(−0.14, 0.09)	(−0.10, 0.15)	(−0.10, 0.16)	(−0.12, 0.10)	(−0.14, 0.10)	(−0.14, 0.10)	(−0.14, 0.10)	(−0.13, 0.09)
	12	−0.07**	−0.04*	−0.05*	−0.06**	−0.07**	−0.07**	−0.07**	−0.06**
		(−0.15, 0.01)	(−0.10, 0.03)	(−0.11, 0.02)	(−0.12, 0.00)	(−0.15, 0.01)	(−0.15, 0.01)	(−0.15, 0.01)	(−0.14, 0.01)
	18	−0.07*	−0.03	−0.04*	−0.06**	−0.07*	−0.07*	−0.07*	−0.06*
		(−0.17, 0.03)	(−0.11, 0.05)	(−0.12, 0.03)	(−0.13, 0.01)	(−0.17, 0.03)	(−0.17, 0.04)	(−0.17, 0.04)	(−0.15, 0.04)
	24	−0.07*	−0.03	−0.04	−0.06*	−0.07*	−0.07*	−0.07*	−0.05*
		(−0.18, 0.04)	(−0.12, 0.06)	(−0.13, 0.05)	(−0.14, 0.02)	(−0.19, 0.04)	(−0.18, 0.05)	(−0.18, 0.05)	(−0.16, 0.05)
	36	−0.08*	−0.04*	−0.06**	−0.08**	−0.11***	−0.10**	−0.10**	−0.07*
		(−0.18, 0.02)	(−0.12, 0.03)	(−0.13, 0.01)	(−0.16, 0.00)	(−0.21, −0.00)	(−0.21, 0.01)	(−0.21, 0.01)	(−0.17, 0.03)
	48	−0.07*	−0.03	−0.06*	−0.07**	−0.10***	−0.09**	−0.09**	−0.06*
		(−0.18, 0.04)	(−0.11, 0.04)	(−0.12, 0.01)	(−0.15, 0.01)	(−0.19, −0.01)	(−0.20, 0.01)	(−0.20, 0.01)	(−0.18, 0.05)
Private Commercial Mortgage Holdings	6	−0.03	0.07	−0.00	−0.08	−0.05	−0.07	−0.07	−0.04
		(−0.36, 0.30)	(−0.25, 0.39)	(−0.28, 0.28)	(−0.39, 0.23)	(−0.35, 0.26)	(−0.38, 0.25)	(−0.38, 0.25)	(−0.32, 0.24)
	12	−0.15**	−0.10*	−0.12*	−0.17**	−0.16**	−0.18***	−0.18***	−0.15**
		(−0.32, 0.02)	(−0.28, 0.08)	(−0.29, 0.04)	(−0.34, 0.01)	(−0.33, 0.02)	(−0.36, −0.00)	(−0.36, −0.00)	(−0.30, 0.01)
	18	−0.19***	−0.13*	−0.16*	−0.18**	−0.20**	−0.23***	−0.23***	−0.18***
		(−0.36, −0.01)	(−0.33, 0.06)	(−0.34, 0.03)	(−0.36, 0.00)	(−0.41, 0.01)	(−0.44, −0.01)	(−0.44, −0.01)	(−0.33, −0.02)
	24	−0.22***	−0.15*	−0.17**	−0.19***	−0.22**	−0.24***	−0.24***	−0.21***
		(−0.41, −0.02)	(−0.37, 0.06)	(−0.38, 0.03)	(−0.39, −0.00)	(−0.45, 0.01)	(−0.47, −0.01)	(−0.47, −0.01)	(−0.39, −0.03)
	36	−0.24***	−0.19**	−0.21***	−0.22***	−0.27***	−0.29***	−0.29***	−0.24***
		(−0.44, −0.04)	(−0.42, 0.03)	(−0.41, −0.00)	(−0.41, −0.03)	(−0.49, −0.05)	(−0.52, −0.06)	(−0.52, −0.06)	(−0.42, −0.06)
	48	−0.21***	−0.18*	−0.18*	−0.20***	−0.27***	−0.30***	−0.30***	−0.21***
		(−0.39, −0.04)	(−0.42, 0.06)	(−0.40, 0.04)	(−0.38, −0.02)	(−0.47, −0.07)	(−0.50, −0.09)	(−0.50, −0.09)	(−0.36, −0.06)
Commercial and Industrial Loans	6	−0.33**	−0.29*	−0.36*	−0.29*	−0.38**	−0.38**	−0.38**	−0.30**
		(−0.71, 0.05)	(−0.72, 0.13)	(−0.80, 0.08)	(−0.67, 0.10)	(−0.82, 0.06)	(−0.82, 0.05)	(−0.82, 0.05)	(−0.65, 0.05)
	12	−0.21***	−0.18**	−0.22**	−0.20**	−0.25***	−0.27***	−0.27***	−0.20***
		(−0.40, −0.03)	(−0.37, 0.02)	(−0.45, 0.00)	(−0.42, 0.01)	(−0.46, −0.04)	(−0.47, −0.08)	(−0.47, −0.08)	(−0.38, −0.02)
	18	−0.21***	−0.17**	−0.23***	−0.22***	−0.28***	−0.30***	−0.30***	−0.22***
		(−0.41, −0.02)	(−0.37, 0.02)	(−0.45, −0.00)	(−0.42, −0.02)	(−0.50, −0.07)	(−0.50, −0.10)	(−0.50, −0.10)	(−0.39, −0.04)
	24	−0.17**	−0.12*	−0.15*	−0.16**	−0.18**	−0.19***	−0.19***	−0.17***
		(−0.34, 0.01)	(−0.30, 0.05)	(−0.35, 0.04)	(−0.33, 0.01)	(−0.37, 0.01)	(−0.38, −0.01)	(−0.38, −0.01)	(−0.32, −0.01)
	36	−0.14***	−0.09*	−0.10*	−0.10*	−0.12*	−0.11*	−0.11*	−0.13***
		(−0.26, −0.01)	(−0.23, 0.06)	(−0.23, 0.03)	(−0.23, 0.03)	(−0.27, 0.03)	(−0.27, 0.04)	(−0.27, 0.04)	(−0.25, −0.00)
	48	−0.14**	−0.12*	−0.10*	−0.10**	−0.18***	−0.18***	−0.18***	−0.13**
		(−0.27, 0.00)	(−0.28, 0.04)	(−0.22, 0.02)	(−0.20, 0.01)	(−0.33, −0.02)	(−0.34, −0.02)	(−0.34, −0.02)	(−0.26, 0.00)
Additional controls:		Benchmark	Intrastate Banking Deregulation	Interstate Banking Deregulation	Home Mortgage Interest Deduction	Average Marginal Tax Rate: Top 1%	Average Marginal Tax Rate: Top 10%	Average Marginal Tax Rate: Lower 90%	Monetary Policy Shocks

Notes: Point estimates measure the cumulative dollar response of lending volumes per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006.

Table B.5: Cumulative Construction Multipliers: Policy Interaction Robustness Checks

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Single-Family Home Construction	6	0.01	−0.01	−0.00	0.00	−0.00	−0.01	−0.01	−0.00
		(−0.07, 0.08)	(−0.09, 0.08)	(−0.09, 0.08)	(−0.08, 0.08)	(−0.09, 0.09)	(−0.09, 0.07)	(−0.09, 0.07)	(−0.08, 0.07)
	12	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01
		(−0.06, 0.10)	(−0.07, 0.09)	(−0.07, 0.10)	(−0.06, 0.10)	(−0.07, 0.10)	(−0.08, 0.09)	(−0.08, 0.09)	(−0.07, 0.09)
	18	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01
		(−0.06, 0.11)	(−0.08, 0.10)	(−0.08, 0.13)	(−0.07, 0.11)	(−0.09, 0.12)	(−0.09, 0.11)	(−0.09, 0.11)	(−0.07, 0.10)
	24	0.03	0.02	0.04	0.03	0.03	0.03	0.03	0.03
		(−0.05, 0.12)	(−0.07, 0.11)	(−0.06, 0.14)	(−0.05, 0.12)	(−0.07, 0.14)	(−0.08, 0.13)	(−0.08, 0.13)	(−0.06, 0.11)
	36	0.08**	0.06*	0.10***	0.08**	0.07*	0.06*	0.06*	0.07**
		(−0.01, 0.16)	(−0.04, 0.15)	(0.01, 0.19)	(−0.00, 0.17)	(−0.04, 0.18)	(−0.04, 0.17)	(−0.04, 0.17)	(−0.01, 0.16)
	48	0.18***	0.16***	0.21***	0.19***	0.18***	0.17***	0.17***	0.18***
		(0.09, 0.27)	(0.06, 0.26)	(0.11, 0.31)	(0.10, 0.28)	(0.06, 0.29)	(0.06, 0.28)	(0.06, 0.28)	(0.09, 0.27)
Construction Excl. Single-Family	6	−0.07*	−0.03	−0.07*	−0.04	−0.08*	−0.06*	−0.06*	−0.08*
		(−0.19, 0.06)	(−0.14, 0.08)	(−0.18, 0.04)	(−0.16, 0.07)	(−0.20, 0.05)	(−0.17, 0.05)	(−0.17, 0.05)	(−0.20, 0.04)
	12	−0.06*	−0.02	−0.07*	−0.05	−0.07*	−0.06*	−0.06*	−0.07*
		(−0.18, 0.05)	(−0.10, 0.06)	(−0.15, 0.02)	(−0.15, 0.05)	(−0.19, 0.04)	(−0.17, 0.05)	(−0.17, 0.05)	(−0.18, 0.04)
	18	−0.09*	−0.03	−0.09**	−0.07*	−0.11*	−0.09*	−0.09*	−0.09*
		(−0.25, 0.07)	(−0.14, 0.08)	(−0.19, 0.01)	(−0.20, 0.06)	(−0.27, 0.06)	(−0.25, 0.07)	(−0.25, 0.07)	(−0.25, 0.06)
	24	−0.11*	−0.04	−0.12**	−0.09*	−0.14*	−0.11*	−0.11*	−0.12*
		(−0.31, 0.09)	(−0.18, 0.10)	(−0.24, 0.00)	(−0.25, 0.07)	(−0.34, 0.07)	(−0.32, 0.09)	(−0.32, 0.09)	(−0.31, 0.08)
	36	−0.18*	−0.09*	−0.19***	−0.15**	−0.22**	−0.20*	−0.20*	−0.18*
		(−0.42, 0.07)	(−0.27, 0.09)	(−0.32, −0.06)	(−0.33, 0.02)	(−0.47, 0.02)	(−0.44, 0.05)	(−0.44, 0.05)	(−0.42, 0.06)
	48	−0.23**	−0.14*	−0.24***	−0.21***	−0.30***	−0.28***	−0.28***	−0.23**
		(−0.49, 0.03)	(−0.32, 0.05)	(−0.35, −0.13)	(−0.40, −0.02)	(−0.52, −0.09)	(−0.52, −0.04)	(−0.52, −0.04)	(−0.48, 0.01)
Total Construction	6	−0.05	−0.03	−0.07	−0.03	−0.06	−0.05	−0.05	−0.06
		(−0.19, 0.10)	(−0.18, 0.12)	(−0.23, 0.09)	(−0.18, 0.11)	(−0.21, 0.10)	(−0.20, 0.10)	(−0.20, 0.10)	(−0.20, 0.07)
	12	−0.04	−0.03	−0.07*	−0.04	−0.05	−0.05	−0.05	−0.05
		(−0.15, 0.08)	(−0.15, 0.10)	(−0.19, 0.05)	(−0.16, 0.07)	(−0.19, 0.08)	(−0.18, 0.08)	(−0.18, 0.08)	(−0.16, 0.06)
	18	−0.05	−0.03	−0.09*	−0.05	−0.07	−0.06	−0.06	−0.06
		(−0.20, 0.11)	(−0.19, 0.13)	(−0.23, 0.05)	(−0.19, 0.08)	(−0.24, 0.09)	(−0.22, 0.10)	(−0.22, 0.10)	(−0.20, 0.08)
	24	−0.05	−0.02	−0.10*	−0.06	−0.07	−0.06	−0.06	−0.06
		(−0.23, 0.13)	(−0.21, 0.16)	(−0.25, 0.05)	(−0.21, 0.10)	(−0.27, 0.12)	(−0.24, 0.12)	(−0.24, 0.12)	(−0.23, 0.10)
	36	−0.06	−0.02	−0.11*	−0.06	−0.10*	−0.09	−0.09	−0.07
		(−0.26, 0.14)	(−0.24, 0.19)	(−0.28, 0.06)	(−0.24, 0.12)	(−0.31, 0.10)	(−0.28, 0.11)	(−0.28, 0.11)	(−0.26, 0.13)
	48	0.02	0.06	−0.03	0.02	−0.06	−0.05	−0.05	0.02
		(−0.18, 0.23)	(−0.15, 0.26)	(−0.20, 0.13)	(−0.16, 0.20)	(−0.25, 0.12)	(−0.22, 0.13)	(−0.22, 0.13)	(−0.18, 0.21)
Additional controls:		Benchmark	Intrastate Banking Deregulation	Interstate Banking Deregulation	Home Mortgage Interest Deduction	Average Marginal Tax Rate: Top 1%	Average Marginal Tax Rate: Top 10%	Average Marginal Tax Rate: Lower 90%	Monetary Policy Shocks

Notes: Point estimates measure the cumulative dollar response of construction expenditures per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006.

Mertens and Montiel Olea (2018). There may also be important interactions with conventional monetary policy not fully encapsulated by controlling for 3-month Treasury yields. Fieldhouse, Mertens, and Ravn (2018) document significant

interactions between housing credit policies and conventional monetary policy. Column [8] documents that credit and construction multipliers are robust to additionally controlling for surprise innovations to the federal funds rate, as constructed by Romer and Romer (2004).[18]

Tables B.6 and B.7 document that the credit and construction multipliers are robust to details affecting the GSEs. Column [1] again reports the point estimates from the benchmark impulse responses reported in Sections 2.4 and 2.5 as a baseline for comparison. Columns [2], [3], [4], and [5] demonstrate that the results are broadly robust to iteratively dropping the following larger narrative policy events from the first-stage regression (2.1): the October 1968 increase in Fannie Mae's permissible debt-to-capital ratio; October 1977 increase in the conforming loan limit; the December 1982 increase in Fannie Mae's debt-to-capital ratio; and the September 2004 capital surcharges imposed on Fannie Mae in response to accounting scandals. While the patterns of divergent lending and construction responses are broadly robust, dropping Fannie Mae's forced recapitalization (the largest policy intervention) from the first stage yields less precisely estimated impulse responses and the crowd-in of private mortgage lending is more front-loaded. The GSEs' footprint in secondary market support for mortgage lending is influenced by the conforming loan limit, which was indexed to home prices in 1989 and was previously revised statutorily. Column [6] documents that the main results are robust to controlling for lagged growth of the real conforming loan limit, deflated by home prices. The effect of GSE purchases may additionally depend on their market share. Columns [7]

[18]The Romer and Romer (2004) measure of monetary shocks are constructed as intended changes of the federal funds rate around FOMC meetings that are orthogonalized to Greenbook forecasts of real GDP growth, GDP deflator growth, and the unemployment rate. The Gertler and Karadi (2015) measure of monetary shocks is not available for the full benchmark sample.

Table B.6: Cumulative Credit Multipliers: GSE Policy Robustness Checks

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Private Home Mortgage Holdings	6	0.41**	0.31*	0.37*	0.27*	0.45*	0.36*	0.22	−0.10
		(−0.06, 0.88)	(−0.18, 0.80)	(−0.11, 0.85)	(−0.21, 0.74)	(−0.38, 1.28)	(−0.08, 0.80)	(−0.30, 0.74)	(−0.57, 0.36)
	12	0.01	−0.06	−0.01	−0.06	0.56*	0.01	−0.08	−0.30***
		(−0.25, 0.26)	(−0.32, 0.19)	(−0.27, 0.25)	(−0.31, 0.19)	(−0.37, 1.48)	(−0.24, 0.27)	(−0.37, 0.21)	(−0.53, −0.07)
	18	0.11*	0.02	0.07	0.06	0.63*	0.05	0.04	−0.08
		(−0.10, 0.31)	(−0.21, 0.24)	(−0.15, 0.29)	(−0.18, 0.29)	(−0.44, 1.70)	(−0.16, 0.27)	(−0.23, 0.30)	(−0.36, 0.19)
	24	0.23***	0.14*	0.18**	0.22**	0.67*	0.18**	0.16*	0.17*
		(0.05, 0.41)	(−0.07, 0.34)	(−0.02, 0.39)	(−0.01, 0.44)	(−0.60, 1.94)	(−0.02, 0.38)	(−0.07, 0.39)	(−0.10, 0.44)
	36	0.28***	0.25**	0.26**	0.31***	−0.14	0.28***	0.19*	0.36***
		(0.07, 0.50)	(−0.01, 0.50)	(−0.00, 0.52)	(0.08, 0.54)	(−1.33, 1.04)	(0.07, 0.49)	(−0.08, 0.46)	(0.18, 0.55)
	48	0.48***	0.49***	0.47***	0.51***	−0.02	0.48***	0.36***	0.60***
		(0.17, 0.78)	(0.18, 0.80)	(0.15, 0.79)	(0.21, 0.82)	(−1.70, 1.66)	(0.22, 0.75)	(0.03, 0.68)	(0.26, 0.94)
Private Multifamily Mortgage Holdings	6	−0.02	−0.04	−0.01	0.01	0.04	−0.01	−0.01	0.04
		(−0.14, 0.09)	(−0.17, 0.10)	(−0.13, 0.11)	(−0.11, 0.12)	(−0.22, 0.29)	(−0.11, 0.09)	(−0.12, 0.11)	(−0.07, 0.16)
	12	−0.07**	−0.08**	−0.07*	−0.06*	−0.12	−0.07***	−0.07*	−0.03
		(−0.15, 0.01)	(−0.16, 0.01)	(−0.15, 0.02)	(−0.14, 0.01)	(−0.50, 0.25)	(−0.13, −0.00)	(−0.15, 0.01)	(−0.09, 0.03)
	18	−0.07*	−0.06*	−0.07*	−0.06*	−0.21	−0.07*	−0.06*	0.01
		(−0.17, 0.03)	(−0.16, 0.05)	(−0.18, 0.04)	(−0.17, 0.05)	(−0.70, 0.28)	(−0.15, 0.02)	(−0.16, 0.03)	(−0.06, 0.08)
	24	−0.07*	−0.03	−0.07*	−0.07*	−0.18	−0.07*	−0.06*	0.02
		(−0.18, 0.04)	(−0.16, 0.09)	(−0.19, 0.05)	(−0.19, 0.05)	(−0.79, 0.42)	(−0.17, 0.03)	(−0.17, 0.05)	(−0.06, 0.09)
	36	−0.08*	−0.05	−0.08*	−0.08*	−0.26*	−0.09**	−0.09*	0.01
		(−0.18, 0.02)	(−0.18, 0.09)	(−0.20, 0.05)	(−0.20, 0.03)	(−0.61, 0.10)	(−0.19, 0.01)	(−0.19, 0.02)	(−0.04, 0.07)
	48	−0.07*	−0.02	−0.06	−0.08*	−0.24*	−0.07*	−0.08*	0.02
		(−0.18, 0.04)	(−0.18, 0.14)	(−0.19, 0.07)	(−0.20, 0.03)	(−0.54, 0.05)	(−0.18, 0.03)	(−0.19, 0.03)	(−0.05, 0.09)
Private Commercial Mortgage Holdings	6	−0.03	−0.09	0.01	−0.00	−0.08	−0.04	−0.03	−0.03
		(−0.36, 0.30)	(−0.43, 0.24)	(−0.32, 0.33)	(−0.30, 0.30)	(−0.67, 0.51)	(−0.32, 0.24)	(−0.32, 0.27)	(−0.27, 0.22)
	12	−0.15**	−0.18***	−0.11*	−0.12*	−0.33	−0.14**	−0.14*	−0.14***
		(−0.32, 0.02)	(−0.36, −0.00)	(−0.29, 0.07)	(−0.29, 0.06)	(−1.19, 0.54)	(−0.31, 0.02)	(−0.32, 0.04)	(−0.28, −0.01)
	18	−0.19***	−0.22***	−0.16*	−0.16*	−0.52*	−0.18***	−0.17**	−0.12**
		(−0.36, −0.01)	(−0.42, −0.02)	(−0.35, 0.04)	(−0.35, 0.04)	(−1.38, 0.34)	(−0.35, −0.02)	(−0.34, 0.01)	(−0.24, 0.01)
	24	−0.22***	−0.23***	−0.20**	−0.19**	−0.51*	−0.21***	−0.18**	−0.11**
		(−0.41, −0.02)	(−0.46, −0.01)	(−0.42, 0.03)	(−0.41, 0.03)	(−1.50, 0.48)	(−0.40, −0.02)	(−0.38, 0.01)	(−0.22, 0.00)
	36	−0.24***	−0.24***	−0.22**	−0.22***	−0.54**	−0.25***	−0.24***	−0.12***
		(−0.44, −0.04)	(−0.48, −0.01)	(−0.45, 0.01)	(−0.43, −0.01)	(−1.17, 0.09)	(−0.45, −0.06)	(−0.43, −0.04)	(−0.24, −0.01)
	48	−0.21***	−0.18*	−0.18**	−0.20***	−0.37*	−0.22***	−0.21***	−0.11*
		(−0.39, −0.04)	(−0.39, 0.03)	(−0.37, 0.01)	(−0.39, −0.02)	(−0.80, 0.07)	(−0.41, −0.04)	(−0.38, −0.04)	(−0.25, 0.02)
Commercial and Industrial Loans	6	−0.33**	−0.39***	−0.34*	−0.35**	0.12	−0.25*	−0.31**	−0.43***
		(−0.71, 0.05)	(−0.74, −0.04)	(−0.77, 0.09)	(−0.74, 0.05)	(−0.51, 0.76)	(−0.61, 0.11)	(−0.63, 0.01)	(−0.84, −0.01)
	12	−0.21***	−0.28***	−0.25***	−0.21***	0.04	−0.16**	−0.21***	−0.25***
		(−0.40, −0.03)	(−0.45, −0.11)	(−0.46, −0.04)	(−0.41, −0.01)	(−0.72, 0.80)	(−0.35, 0.02)	(−0.40, −0.02)	(−0.45, −0.06)
	18	−0.21***	−0.29***	−0.27***	−0.23***	−0.00	−0.17**	−0.21***	−0.27***
		(−0.41, −0.02)	(−0.49, −0.09)	(−0.47, −0.06)	(−0.43, −0.03)	(−0.74, 0.73)	(−0.34, 0.01)	(−0.41, −0.01)	(−0.53, −0.01)
	24	−0.17**	−0.22***	−0.18***	−0.18***	0.09	−0.13*	−0.13*	−0.19*
		(−0.34, 0.01)	(−0.40, −0.04)	(−0.35, −0.01)	(−0.35, −0.00)	(−0.63, 0.80)	(−0.29, 0.03)	(−0.31, 0.05)	(−0.44, 0.06)
	36	−0.14***	−0.16***	−0.08*	−0.12**	−0.17	−0.12**	−0.10*	−0.12*
		(−0.26, −0.01)	(−0.29, −0.03)	(−0.22, 0.06)	(−0.25, 0.00)	(−0.54, 0.20)	(−0.24, 0.00)	(−0.24, 0.03)	(−0.28, 0.04)
	48	−0.14**	−0.11*	−0.11*	−0.13**	−0.07	−0.11**	−0.14**	−0.08
		(−0.27, 0.00)	(−0.25, 0.03)	(−0.25, 0.04)	(−0.27, 0.01)	(−0.39, 0.25)	(−0.24, 0.01)	(−0.28, 0.01)	(−0.27, 0.11)
Regression modification:		Benchmark	Omitting Oct. 1968	Omitting Oct. 1977	Omitting Dec. 1982	Omitting Sep. 2004	Conforming Loan Limit Controls	Portfolio Growth Controls	MBS Growth Controls

Notes: Point estimates measure the cumulative dollar response of lending volumes per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006, except for column [8], which is truncated to January 1973–December 2006 to reflect the period of agency securitization activity.

Table B.7: Cumulative Construction Multipliers: GSE Policy Robustness Checks

	Months	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Single-Family Home Construction	6	0.01	−0.01	0.01	0.00	0.07	0.01	−0.01	−0.05*
		(−0.07, 0.08)	(−0.08, 0.06)	(−0.07, 0.09)	(−0.07, 0.08)	(−0.10, 0.23)	(−0.07, 0.08)	(−0.08, 0.05)	(−0.13, 0.03)
	12	0.02	−0.01	0.00	0.02	0.27*	0.02	0.00	−0.02
		(−0.06, 0.10)	(−0.08, 0.07)	(−0.08, 0.08)	(−0.06, 0.10)	(−0.15, 0.70)	(−0.06, 0.10)	(−0.07, 0.08)	(−0.11, 0.06)
	18	0.02	−0.01	−0.00	0.03	0.29*	0.02	0.01	−0.02
		(−0.06, 0.11)	(−0.11, 0.09)	(−0.09, 0.09)	(−0.06, 0.12)	(−0.16, 0.73)	(−0.07, 0.11)	(−0.08, 0.10)	(−0.13, 0.10)
	24	0.03	0.01	0.01	0.04	0.28*	0.03	0.02	0.01
		(−0.05, 0.12)	(−0.10, 0.11)	(−0.08, 0.09)	(−0.04, 0.13)	(−0.16, 0.73)	(−0.06, 0.12)	(−0.06, 0.11)	(−0.10, 0.12)
	36	0.08**	0.07*	0.07*	0.09***	0.20**	0.08**	0.06**	0.07*
		(−0.01, 0.16)	(−0.02, 0.17)	(−0.03, 0.16)	(0.01, 0.17)	(−0.02, 0.41)	(−0.01, 0.16)	(−0.01, 0.14)	(−0.02, 0.16)
	48	0.18***	0.19***	0.19***	0.20***	0.25**	0.18***	0.17***	0.18***
		(0.09, 0.27)	(0.10, 0.29)	(0.10, 0.29)	(0.11, 0.29)	(−0.01, 0.52)	(0.10, 0.26)	(0.09, 0.25)	(0.08, 0.29)
Construction Excl. Single-Family	6	−0.07*	−0.04	−0.03	−0.07*	−0.17*	−0.04	−0.06	−0.07*
		(−0.19, 0.06)	(−0.16, 0.08)	(−0.14, 0.09)	(−0.19, 0.05)	(−0.47, 0.14)	(−0.16, 0.07)	(−0.17, 0.06)	(−0.18, 0.05)
	12	−0.06*	−0.06*	−0.06*	−0.07*	−0.17	−0.04	−0.06*	−0.05*
		(−0.18, 0.05)	(−0.18, 0.06)	(−0.19, 0.06)	(−0.18, 0.04)	(−0.67, 0.34)	(−0.14, 0.05)	(−0.16, 0.05)	(−0.15, 0.05)
	18	−0.09*	−0.10*	−0.10*	−0.09*	−0.23	−0.07	−0.08*	−0.07
		(−0.25, 0.07)	(−0.27, 0.07)	(−0.27, 0.07)	(−0.25, 0.07)	(−0.82, 0.36)	(−0.20, 0.07)	(−0.23, 0.07)	(−0.21, 0.07)
	24	−0.11*	−0.13*	−0.13*	−0.12*	−0.35	−0.09*	−0.11*	−0.06
		(−0.31, 0.09)	(−0.35, 0.09)	(−0.34, 0.08)	(−0.32, 0.08)	(−1.15, 0.45)	(−0.26, 0.08)	(−0.30, 0.09)	(−0.22, 0.10)
	36	−0.18*	−0.19*	−0.21*	−0.19*	−0.41	−0.16*	−0.18*	−0.08
		(−0.42, 0.07)	(−0.47, 0.09)	(−0.47, 0.05)	(−0.44, 0.07)	(−1.32, 0.50)	(−0.38, 0.06)	(−0.41, 0.05)	(−0.27, 0.11)
	48	−0.23**	−0.21*	−0.25**	−0.24**	−0.51*	−0.21**	−0.24***	−0.09
		(−0.49, 0.03)	(−0.52, 0.10)	(−0.51, 0.02)	(−0.50, 0.03)	(−1.47, 0.44)	(−0.44, 0.02)	(−0.49, −0.00)	(−0.30, 0.12)
Total Construction	6	−0.05	−0.05	−0.00	−0.05	−0.06	−0.02	−0.05	−0.13**
		(−0.19, 0.10)	(−0.20, 0.11)	(−0.15, 0.14)	(−0.19, 0.10)	(−0.43, 0.31)	(−0.16, 0.12)	(−0.19, 0.09)	(−0.28, 0.02)
	12	−0.04	−0.07*	−0.06	−0.05	0.12	−0.02	−0.05	−0.09*
		(−0.15, 0.08)	(−0.19, 0.04)	(−0.18, 0.07)	(−0.17, 0.07)	(−0.51, 0.74)	(−0.14, 0.10)	(−0.16, 0.07)	(−0.22, 0.04)
	18	−0.05	−0.10*	−0.08*	−0.06	0.09	−0.03	−0.06	−0.09
		(−0.20, 0.11)	(−0.25, 0.05)	(−0.24, 0.07)	(−0.21, 0.10)	(−0.58, 0.76)	(−0.17, 0.11)	(−0.21, 0.09)	(−0.29, 0.11)
	24	−0.05	−0.11*	−0.10*	−0.06	0.05	−0.03	−0.06	−0.06
		(−0.23, 0.13)	(−0.30, 0.08)	(−0.27, 0.08)	(−0.24, 0.13)	(−0.86, 0.97)	(−0.19, 0.13)	(−0.24, 0.11)	(−0.28, 0.16)
	36	−0.06	−0.07	−0.10	−0.05	−0.03	−0.03	−0.08	0.00
		(−0.26, 0.14)	(−0.30, 0.16)	(−0.31, 0.11)	(−0.26, 0.17)	(−1.04, 0.98)	(−0.22, 0.15)	(−0.27, 0.11)	(−0.21, 0.22)
	48	0.02	0.07	0.01	0.04	0.01	0.05	−0.02	0.13*
		(−0.18, 0.23)	(−0.17, 0.31)	(−0.20, 0.22)	(−0.18, 0.26)	(−1.37, 1.39)	(−0.15, 0.25)	(−0.21, 0.17)	(−0.06, 0.32)
Regression modification:		Benchmark	Omitting Oct. 1968	Omitting Oct. 1977	Omitting Dec. 1982	Omitting Sep. 2004	Conforming Loan Limit Controls	Portfolio Growth Controls	MBS Growth Controls

Notes: Point estimates measure the cumulative dollar response of construction expenditures per dollar of cumulated GSE purchases. 2SLS specifications are estimated as in equation (2.2), using the not cyclically motivated regulatory policies as an instrument for actual GSE purchases. OLS regressions are estimated without instrumentation, using actual GSE purchases on the right-hand side. Reported in parentheses are 95% Newey and West (1987) confidence bands. Asterisks denote significance at the 68%, 90%, or 95% confidence interval. Sample: January 1967–December 2006, except for column [8], which is truncated to January 1973–December 2006 to reflect the period of agency securitization activity.

documents that the credit and construction multipliers are robust to controlling for lagged growth rates of the GSEs' mortgage holdings, measured as the log first difference of their combined real retained portfolios. Column [8] doc-

uments that the credit and construction multipliers are broadly robust to controlling for lagged growth rates of the real volume of GSE MBS outstanding (securitization market share is non-stationary).

Additional Robustness Checks: Housing Construction and Home Sales

The pattern of GSE purchases expanding single-family housing activity while crowding out commercial real estate activity, as documented for construction flows in Section 2.5.1, is robust to analyzing the response of related measures of single-family housing and commercial activity. Figure B.8 depicts the response of housing activity following news shocks about GSE balance sheet expansions, estimated as in equation (2.8).[19] The left panel depicts a significant rise in building permits between 4 and 16 months following news about pending GSE balance sheet expansions. The middle panel sees a significant rise in housing starts for single-family homes that lags slightly behind and is more persistent than the response of building permits. The right panel depicts a significant but more delayed rise in the number of new single-family homes sold, which rise 1% to 1.5% at horizons of 12 to 24 months following news about pending expansions of GSE purchases. Reassuringly, the staggered responses of building permits, housing starts, and lagged home sales follow the actual cycle of new housing development, and are of roughly the same magnitude.

[19]Twelves lags of any left-hand-side variables not included in the benchmark controls are additionally rotated into the control set, expressed in log first differences.

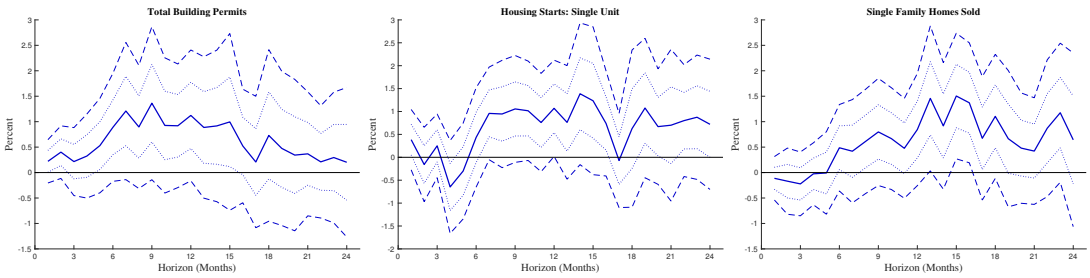

Figure B.8. Housing Market Responses to GSE Purchase Shocks

Notes: Finer lines are 68% and 95% Newey and West (1987) confidence intervals. Sources: see the data appendix.

The significant rise in new home purchases at horizons above one year, after new construction is completed, is consistent with the more gradual, persistent rise in private home mortgage holdings depicted in Figure 2.3. The response of multifamily housing starts sees a short-lived decline at horizons of under 6 months and never sees a significant expansion at longer horizons (not depicted). As with the construction multipliers depicted in Figure 2.7, the housing market responses in Figure B.8 provide evidence that GSE purchase shocks, in addition to stimulating home mortgage lending, induce an expansion in real single-family housing investment because of significant real-financial linkages. The impulse responses would, however, misleadingly suggest that U.S. housing credit policies can be used as an effective form of stabilization policy to boost investment.

Lending Responses to Broader Credit Market Shocks

The Fieldhouse and Mertens (2017) narrative record can be interpreted as developing a series of housing-specific shocks to the supply of mortgage credit resulting from regulatory policy changes affecting government agencies. In this

sense, my analysis complements a larger empirical literature on the effects of broad-based credit supply shocks.[20] Sections 2.4 and 2.5 present evidence of disparate lending and related real responses to the not cyclically motivated secondary market purchase shocks. Such disparate lending responses might ensue from credit shocks more generally if driven by bank balance sheet or origination capacity constraints. I compare the impulse responses to housing-specific credit shocks with responses to the Gilchrist and Zakrajšek (2012) excess bond premium—a broader measure of credit shocks. The SVAR impulse response analysis provides complementary evidence of divergent lending dynamics for credit shocks more generally. Results additionally underscore the endogenous expansion of GSE activity during periods of credit market distress, a source of reverse causality bias that my narrative identification strategy is intended to circumvent.

The excess bond premium is an aggregated measure of residual variation in corporate bonds spreads, with spreads orthogonalized to bond-specific characteristics and firm-specific measures of expected default.[21] Gilchrist and Zakrajšek (2012) find that the residual variation in credit spreads has considerable forecasting power: a spike in spreads induces significant, persistent declines in investment, consumption, and output. The authors interpret the excess bond premium as a credit supply shock unrelated to underlying default risk, or a shift in the risk-bearing capacity of the U.S. financial sector.

[20] See, for example, Peek, Rosengren, and Tootell (2003); Gilchrist, Yankov and Zakrajšek (2009); Gilchrist and Zakrajšek (2012); Bassett, Chosak, Driscoll, and Zakrajsek (2014); Mian, Sufi and Verner (2017); and Di Maggio and Kermani (2017).

[21] The Gilchrist and Zakrajšek (2012) credit spread is constructed from microdata by measuring each corporate bond's yield-to-maturity relative to the yield of a synthetic Treasury security matching that bond's cash flow, purging duration and maturity mismatch. The credit spread for each bond is then regressed on an expected measure of default, a vector of bond-specific characteristics, and fixed effects for industry and S&P credit rating. The excess bond premium is constructed as the average credit spread less the average spread predicted by firm and bond characteristics, capturing aggregated residual variation in credit spreads.

I estimate impulse responses of economic activity in a recursively identified SVAR, a modified version of the Gilchrist and Zakrajšek (2012) VAR system that incorporates credit flows and housing activity and is estimated on monthly as opposed to quarterly data. The core identifying assumption behind the recursive SVAR is that slow-moving macroeconomic aggregates cannot contemporaneously respond to changes in credit conditions because of stickiness in investment and consumption decisions, which seems plausible for a VAR system estimated on monthly data. I first estimate a reduced-form VAR

$$Y_t = A_1 Y_{t-1} + ... + A_p Y_{t-p} + \nu_t \tag{B.1}$$

with the following variables in Y_t: the log first differences of industrial production, the consumer price index, housing starts, real mortgage originations, and real GSE net purchases; the excess bond premium; cumulated Fama and French market excess returns index; federal funds rate; 10-year Treasury yield; and conventional mortgage spread over 10-year Treasuries. I estimate the reduced-form VAR on monthly data from January 1974–December 2006 and, in keeping with Gilchrist and Zakrajšek (2012), setting lag length $L = 12$.[22] Block-recursive identification of impulse responses from the structural shocks, ϵ_t, of the SVAR model

$$B_0 Y_t = B_1 Y_{t-1} + ... B_p Y_{t-p} + \epsilon_t \tag{B.2}$$

$$\Leftrightarrow Y_t = \underbrace{B_0^{-1} B_1}_{A_1} Y_{t-1} + ... + \underbrace{B_0^{-1} B_p}_{A_p} Y_{t-p} + \underbrace{B_0^{-1} \epsilon_t}_{\nu_t} \tag{B.3}$$

from the reduced-form VAR innovations, ν_t, is achieved by assuming only fast-moving financial market variables can respond to the excess bond premium on impact, while non-financial variables respond with a lag of at least one month. Imposing these contemporaneous zero restrictions on B_0^{-1} enables the identifi-

[22] The excess bond premium is available January 1973 onwards, and 12 observations are needed before the start of the sample.

cation of its remaining elements from the reduced-form error covariance matrix $\mathbb{E}(\nu_t \nu_t') = \Sigma_\nu = B_0^{-1} B_0^{-1\prime}$.[23]

The following variables are iteratively rotated into the benchmark specification for Y_t: single-family and multifamily housing starts (dropping total housing starts), real GSE mortgage holdings (dropping real GSE net purchases), real home mortgage debt outstanding, real multifamily mortgage debt outstanding, real commercial mortgage debt outstanding, real agency MBS outstanding, a measure of cumulated GSE excess stock returns, real personal consumption expenditure, a real home price index, and the unemployment rate. All additional variables save the unemployment rate are expressed in log first differences.

Figures B.9 and B.10 depict the structural impulse response functions to a one standard deviation increase in the excess bond premium—roughly a 45 basis point increase in corporate credit spreads over this sample. All impulse responses are cumulated for variables expressed in log first differences. Finer dashed lines are 68% confidence intervals based on 2,000 bootstrap replications. Similar to the impulse responses in the Gilchrist and Zakrajšek (2012) SVAR specification, Figure B.9 sees a spike in the excess bond premium gradually fading over two years (top-left panel), and the shock is broadly contractionary. The credit shock induces significant but transitory declines in consumption and output (measured here as industrial production rather than GDP) as well as a persistent decline in excess stock market returns. The credit shock additionally induces a significant rise in the unemployment rate for two years and policy accommodation by the Fed, with the funds rate declining as much as 50 basis points after one year. The 10-year Treasury yield persistently falls by 15 to 20

[23] Because of its symmetry, Σ_ν contains $n(n-1)/2$ unique elements, hence B_0^{-1} can be solved from a Cholesky decomposition of Σ_ν by imposing at least $n(n-1)/2$ exclusion restrictions on B_0^{-1}.

basis points but is less precisely estimated, which, as with the response of the funds rate, is in line with the estimates of Gilchrist and Zakrajšek (2012).

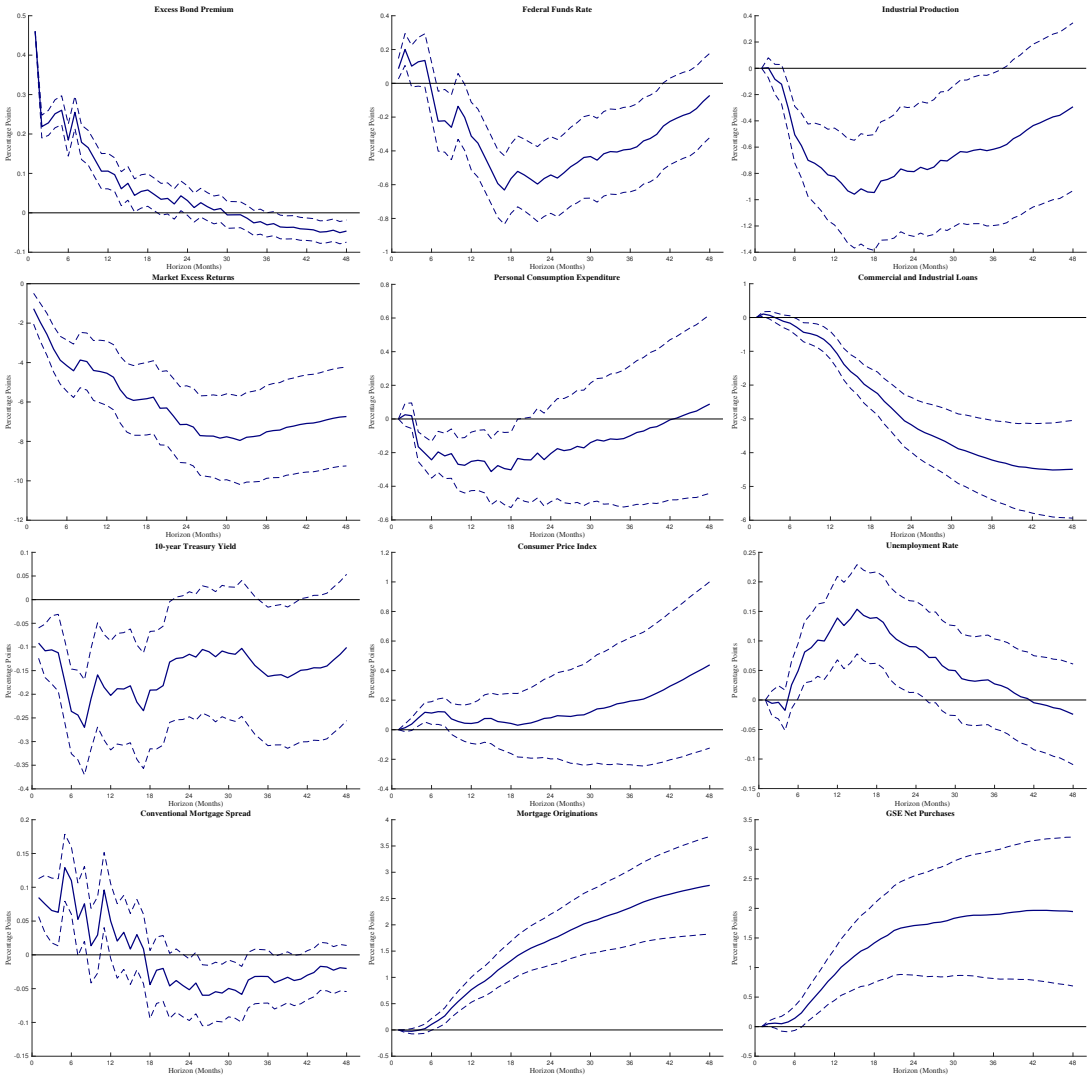

Figure B.9. Macro and Housing Recursive SVAR Responses to Excess Bond Premium Shocks

Notes: Impulse responses are scaled to a one standard deviation innovation to the Gilchrist and Zakrajšek (2012) excess bond premium. Finer dashed lines are 68% delta method confidence intervals based on 2,000 bootstrap replication standard error estimates, as in Kilian and Lütkepohl (2017). Sample: January 1974–December 2006.

Unlike Gilchrist and Zakrajšek (2012), my SVAR system is extended to encompass the housing, mortgage lending, and commercial lending activity.[24] As

[24]The SVAR specification of Gilchrist and Zakrajšek (2012) includes quarterly time series for

depicted in the lower panels of Figure B.9, the excess bond premium shock induces a significant jump in real residential mortgage originations of around 8–10% over the first year, which is not followed by any mean reversion. Conventional mortgage spreads see a significant increase of 5–10 basis points over the first year, followed by a decrease of around 5 basis points at horizons approaching two years. Driven by the decline in Treasury yields, conventional mortgage rates persistently fall by 10 to 20 basis points for horizons above six months in response to the shock (not depicted).

GSE activity also jumps in response to the excess bond premium credit shock. The lower right panel of Figure B.9 shows GSE retained portfolio purchases persistently rising 1.5% to 2% over two years following excess bond premium shocks. As seen in the lower-left panel of Figure B.10, there is no significant response of GSE retained portfolio holdings, indicating that the rise in originations and net purchases coincides with elevated repayment and refinancing activity. The lower-middle panel of Figure B.10 depicts a significant rise in the volume of agency MBS outstanding, which increases by 2–2.5%. A weighted average of the GSE stock prices significantly outperforms the market index for two years following the excess bond premium shock, as depicted in the lower-right panel of Figure B.10. The rise in GSE purchase and securitization activity appears a profitable expansion of business in the midst of deteriorating credit conditions.

As with the impulse responses to the narrative GSE regulatory shocks presented in Section 2.4, the excess bond premium shock induce divergent lend-

the log differences of real personal consumption expenditures, real business fixed investment, real GDP, and the GDP price deflator; the quarterly average of the EBP; the quarterly (value-weighted) excess stock market return from CRSP; the 10-year Treasury yield; and the effective federal funds rate, and it is estimated over January 1973–September 2010.

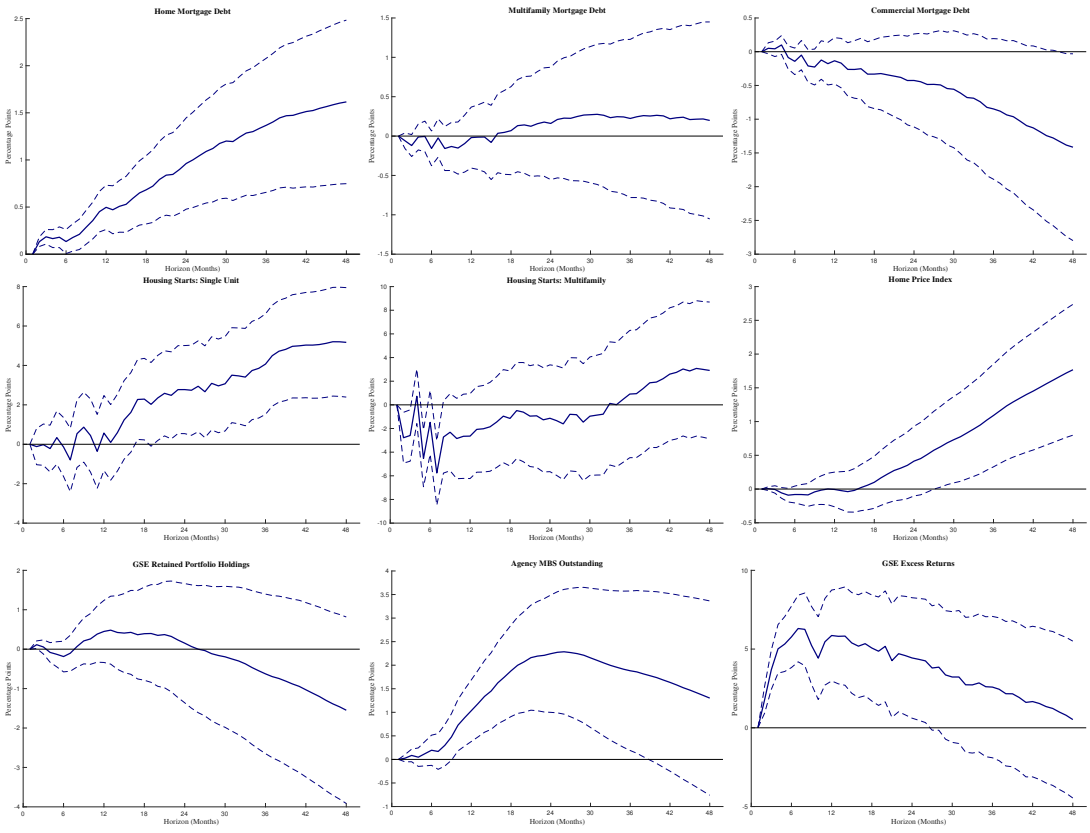

Figure B.10. Additional Housing and Agency Recursive SVAR Responses to EBP Shocks

Notes: Impulse responses are scaled to a one standard deviation innovation to the Gilchrist and Zakrajšek (2012) excess bond premium. Finer dashed lines are 68% delta method confidence intervals based on 2,000 bootstrap replication standard error estimates, as in Kilian and Lütkepohl (2017). Sample: January 1974–December 2006.

ing responses across markets. The volume of home mortgage debt outstanding gradually increases, seeing a persistent and significant increase of 1.5% after four years, as depicted in the top-left panel of Figure B.10. The faster and larger increase of mortgage originations relative to mortgage debt outstanding again suggests a spike in refinancing activity, followed by a more gradual rise in new purchase originations. As depicted in the middle-left panel of Figure B.10, a persistent increase in housing starts for single-family homes lags behind the rise in originations and roughly coincides with the expansion of home mortgage debt. Single-family housing starts see a significant increase at horizons

above 18 months and are persistently 5% higher four years after an excess bond premium shock. Multifamily mortgage lending, however, sees no statistically significant response and the point estimates are quite small, as depicted in the top-middle panel. There is some evidence of a temporary reduction in housing starts for multifamily dwellings in the first eight months following an excess bond premium shock, and no significant response at longer horizons.

Contrary to residential mortgage lending, commercial mortgage debt outstanding falls steadily following the excess bond premium shock, as depicted in the top-right panel of Figure B.10. While the point estimates are insignificant at shorter horizons, there is a significant 1.5% reduction in the volume of lending roughly four years following the credit shock. As depicted in the middle-right panel of Figure B.9, the volume of C&I loans outstanding gradually falls over three years, persistently decreasing by more than 4% after four years. The persistent reduction in C&I loan volumes stands in contrast to the rebound in industrial production and the unemployment rate; the reduction in C&I lending ensuring from GSE purchase shocks, as depicted in Figure 2.6, is similarly persistent.

Housing-specific credit supply shocks from the secondary mortgage market induce an increase in home mortgage lending and a decrease in commercial lending; similarly divergent lending patterns emerge in response to contractionary, broad-based credit supply shocks—which also spur an increase in secondary market activity. The SVAR impulse response analysis provides complementary evidence of significant, persistent portfolio rebalancing effects arising from credit supply shocks. The SVAR impulse responses similarly suggest a significant degree of substitutability between originating home mortgages and

commercial loans at the level of primary market lenders. Activity in mortgage and construction markets for one- to four-family dwellings expand considerably in response to adverse credit shocks, perhaps spurred on to a degree by the expansion in GSE purchases and securitization activity, as intended by policymakers. The mortgage and construction markets for multifamily dwellings, however, merely seem effectively insulated from excess bond premium shocks. Impulse responses to broader credit shocks, measured by the Gilchrist and Zakrajšek (2012) excess bond premium, thus find similarly divergent, market-segmented responses of lending and construction activity in a recursive SVAR framework as documented in Sections 2.4 and 2.5.

The recursive SVAR impulse responses are also broadly robust to estimating an alternative SVAR-instrumental variable (SVAR-IV) framework identified using a measure of residual variation in the excess bond premium, having been orthogonalized to contemporaneous macroeconomic controls, as an instrument for the Gilchrist and Zakrajšek (2012) credit spread measure (not depicted). The identifying assumption behind the SVAR-IV specification is that the residual variation in the excess bond premium affects credit spreads on impact, but only affects other financial variables and macro aggregates through its impact on credit spreads.

Aggregate C&I Crowd-out from the Fed's MBS Purchases

I document evidence of pre-crisis housing credit policies crowding out aggregate C&I lending volumes, complementing work by Chakraborty, Goldstein, and MacKinlay (2017), who find that the Fed's MBS purchases spurred a relative

increase in mortgage originations and decrease in C&I loan growth for treated banks. To benchmark aggregate effects of the Fed's recent conduct of housing credit policies to the results in Section 2.4, I estimate LP-OLS forecasts of lending responses to the Fed's MBS purchases. Lending responses to the Fed's MBS purchases are contrasted with those to the Fed's purchases of Treasuries, which should reflect a similar policy endogeneity bias without operating through a mortgage originations channel.

LP-OLS estimates do not share the causal interpretation of LP-IV estimates and are more suggestive, as the Fed's purchases during the crisis were clearly endogenously motivated; see Fieldhouse and Mertens (2017). But while LP-IV and LP-OLS estimates of lending responses to GSE purchases vary considerably for home mortgage lending and GSE securities outstanding, differences in LP-IV and LP-OLS estimates are relatively small for commercial lending responses. Much of the bias arising in the LP-OLS estimates appears to be driven by the GSEs' endogenous response to the flow of home mortgage originations and residential housing market conditions, not by conditions in other credit markets outside of their statutory charters. If anything, the LP-OLS estimates underestimate crowd-out effects relative to the LP-IV estimates by picking up the spurious negative correlation between countercyclical purchases and deteriorating commercial credit conditions. Moreover, lagged controls reduce the scope for reverse causality bias in both regression frameworks.

The local projection regression specification for forecasting cumulative changes in commercial lending, y_t, in response to the Fed's purchases is similar to regression (2.2), but estimated by OLS rather than 2SLS:

$$\frac{y_{t+h} - y_{t-1}}{X_t} = a_h + b_h \frac{\sum_{j=0}^{h} \mathrm{O}_{t+j}}{X_t} + \varphi_h(L)\mathrm{W}_{t-1} + u_{t+h}, \tag{B.4}$$

where o_t are the Federal Reserve System's monthly open market operation purchases of either agency MBS or Treasury securities (by date of settlement), and scale factor X_t is again a trend of real personal income.[25] Lagged controls, W_t, include growth in total housing starts, industrial production, and the consumer price index (all measured quarter-over-quarter); GSE retained mortgage holdings and agency MBS held by third parties (both scaled by X_t); the federal funds rate; 10-year Treasury yield; BAA-AAA corporate bond spread; and conventional mortgage spread over 10-year Treasury yields.[26] The Fed's monthly purchases of agency MBS and Treasury securities, GSE retained portfolio mortgage holdings, and agency MBS held by third parties are deflated using the CPI-U. Lagged values of the left-hand-side variable of interest, y_t/X_t, are rotated in for each regression. W_t additionally includes a QE event indicator series to control for announcement effects regarding LSAPs, although the results are robust to its omission.[27] Projecting commercial lending of interest on lagged controls for GSE mortgage holdings and securitization activity, housing market activity, industrial output, and credit spreads amounts to estimating the effect of the Fed's purchases on forecast errors of commercial lending, reducing the scope for reverse causality bias. Equation (B.4) is estimated on a monthly sample over January 2008–March 2018, with control lag length reduced to $L = 6$ and the impulse horizon truncated to $H = 24$ in light of the shorter sample size.

The upper panel of Figure B.11 depicts the LP-OLS forecasts of C&I loan volumes in response to one dollar in Fed purchases of agency MBS (solid blue)

[25]The Fed's purchases are aggregated from transactions level microdata available from the New York Fed; see the data appendix.

[26]Agency MBS held by third parties are agency pools net of agency MBS held by Fannie and Freddie; see the data appendix.

[27]The QE event indicator series are an expanded set of those used in Krishnamurthy and Vissing-Jørgensen (2011) with updates from Greenlaw et al. (2018), as detailed in the data appendix.

and Treasury securities (dotted gray) cumulated over each forecast horizon h. Dashed blue lines are 95% Newey and West (1987) confidence intervals for lending responses to the Fed's MBS purchases. The top-left panel of Figure B.11 sees a persistent, significant decline in total C&I lending of 10 to 25 cents in response to one dollar of the Fed's MBS purchases. C&I lending sees a smaller 5- to 10-cent decline for each dollar of the Fed's purchases of Treasuries over the same period. The decline in aggregate C&I lending appears to be largely driven by lending activity of large domestically chartered commercial banks, which see a loan reduction of up to 15 cents per dollar of MBS purchases (middle panel). There is a significant, persistent decline in foreign banks' C&I lending of roughly 5 cents per dollar of MBS purchases (right panel).[28] Small domestically chartered commercial banks see a significant, albeit smaller and more transitory, decline in C&I lending for horizons of up to 16 months (not pictured).

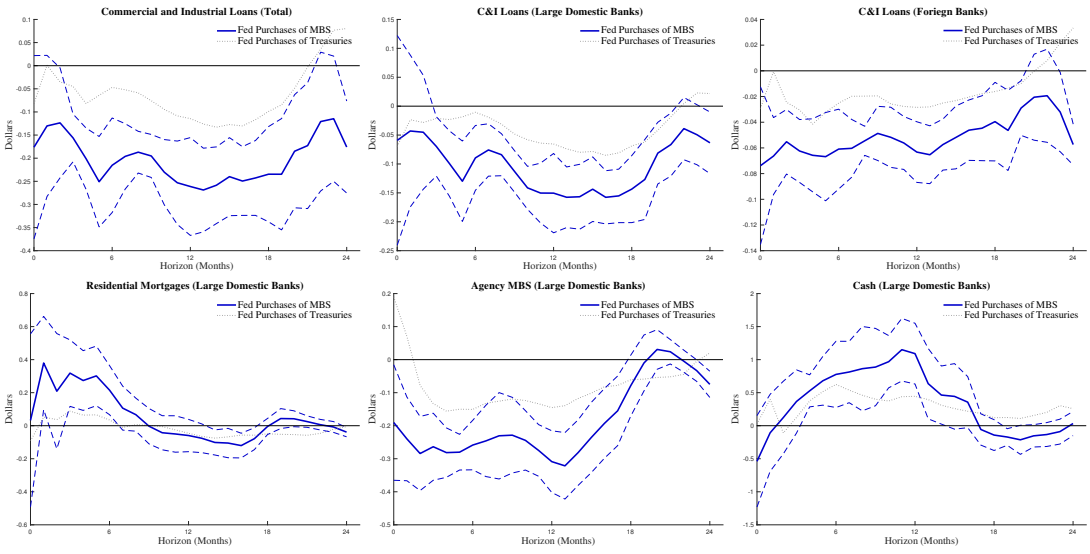

Figure B.11. Local Projections Impulse Responses to Fed QE Purchases

Notes: Local projections impulse responses to cumulated Federal Reserve MBS purchases (solid blue) and Treasury purchases (dotted gray). Finer dashed blue lines are 95% Newey and West (1987) confidence intervals. Sample: January 2008–March 2018.

[28]Credit Suisse, UBS, Deutsche Bank, RBC, BNP Paribas, Nomura Securities, and Mizuho Securities were among the Federal Reserve's largest counterparties for its MBS purchases.

To shed light on portfolio rebalancing dynamics potentially related to decreased C&I lending, the lower panel of Figure B.11 reports other balance sheet responses of large domestically chartered commercial banks. The lower-left panel depicts a statistically significant increase in large commercial banks' holdings of residential mortgages, which rise by 30 to 40 cents per dollar in purchases over horizons of up to six months, roughly coincident with the decrease in their C&I lending volumes; the response is comparable in both timing and magnitude to the short-term warehousing response of private sector mortgage holdings to GSE purchase shocks, as depicted in Figure 2.3 and Appendix Figure B.6. Reassuringly, no significant response of commercial bank mortgage holdings is forecasted by the Fed's purchases of Treasuries, which would not operate through mortgage origination channel. The lower-middle panel depicts a persistent, significant reduction in large commercial banks' holdings of agency MBS, which could be driven either by banks selling assets to the Fed or by the Fed decreasing the available supply of newly pooled agency MBS. The lower-right panel sees a significant expansion in large commercial banks' cash holdings (including reserves), which rise by as much as one dollar in per dollar of the Fed's MBS purchases over the same horizon; reassuringly, the Fed's purchases of Treasuries predict a similar increase in cash holdings for much of the forecast horizon.

Collectively, the LP-OLS forecasting analysis suggests that the Fed's MBS purchases induce large commercial banks—the Fed's main counterparties in the TBA forward market for agency MBS—to temporarily divert resources toward originating residential mortgages and away from originating C&I loans, and then swap pooled mortgages for reserves without any mean reversion of C&I lending volumes. This dynamic is strikingly similar to the response of pri-

vate mortgage holdings and commercial lending in response to GSE purchase shocks, as depicted in Section 2.4. My results suggest that the mortgage purchases of the GSEs and the Federal Reserve operate in part through a similar mortgage originations channel, both inducing persistent crowd-out of commercial lending in the process of spurring increased originations of residential mortgages.

Appendix B3: Data Sources and Construction

Figure 2.2: GSE retained portfolio holdings measure the balance sheet holdings of Fannie Mae and Freddie Mac, excluding off-balance sheet guaranteed MBS held by third parties, while non-GSE mortgage holdings measure all other residential mortgage debt outstanding (for one-to- four-family homes and multifamily homes). Fannie Mae's monthly retained portfolio holdings is constructed from various issues of the *Federal Reserve Bulletin* (prior to 2003) and Fannie's Monthly Summary Highlights reports. Freddie Mac's monthly retained portfolio holdings is constructed from various issues of the *Federal Reserve Bulletin* (prior to 2003) and Freddie's Monthly Volume Survey reports. The monthly frequency series for seasonally adjusted residential mortgage debt outstanding is from Fieldhouse, Mertens, and Ravn (2018) and is constructed from quarterly data from the Financial Accounts of the United States and interpolated to a monthly frequency using monthly mortgage originations and a linear smoothing of implied repayment rates. Seasonally adjusted monthly data for net portfolio purchases of Fannie and Freddie are also from Fieldhouse, Mertens, and Ravn (2018), and were compiled from various issues of the *Federal Reserve Bulletin*, Fannie's Monthly Summary Highlights reports, and Lehnert, Passmore,

and Sherlund (2008). Data have been seasonally adjusted using the Census Bureau's X-13 program.

Data sources for the benchmark controls in regressions (2.1) and (2.2) are as follows: Interest rate controls for the 3-month T-bill rate and 10-year Treasury rate are from the Federal Reserve Bank of St. Louis's FRED database (series GS10 and TB3MS). The BAA-AAA bond spread is constructed as Moody's seasoned Baa corporate bond yield less Moody's seasoned Aaa corporate bond yield (series BAA and AAA from FRED). The conventional mortgage rate is from Fieldhouse, Mertens, and Ravn (2018), which is constructed as the average monthly commitment rate from Freddie Mac's primary mortgage market survey (1971 onwards) spliced with the FHA series for conventional mortgage rates in the primary market (from various issues of the *Federal Reserve Bulletin*). The series for residential mortgage originations is from Fieldhouse, Mertens, and Ravn (2018), and is primarily constructed from the Department of Housing and Urban Development's discontinued Survey of Mortgage Lending Activity (for 1970–1997), obtained from the National Archives and Records Administration; more recent data are interpolated from the Mortgage Bankers' Association's quarterly originations data and weekly mortgage applications data. The real home price index is from Fieldhouse, Mertens, and Ravn (2018) and is primarily constructed from the (repeat-transactions) Freddie Mac Home Price Index (post-1975) and the home purchase price component of the Consumer Price Index; this series is seasonally adjusted using the Census Bureau's X-13 program and deflated using the core PCE price index. Monthly seasonally adjusted series for housing starts, the core personal consumption expenditures (PCE) price index (excluding food and energy), personal income, and the civilian unemployment rate are from FRED (series HOUST, PCEPILFE, PI, and U6, respectively).

All real series are deflated using the core PCE price index.

Figure 2.3: The series for total private direct holdings of mortgage debt are constructed from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54), with all underlying series seasonally adjusted using the Census Bureau's X-13 program. Private direct holdings of one- to four-family home mortgages are summed across depository institutions (line 8), life insurance companies (line 13), and individuals and others (line 76). Private direct holdings of multifamily mortgages are summed across depository institutions (line 9), life insurance companies (line 14), and individuals and others (line 77). Private direct holdings of commercial mortgages are nonfarm, nonresidential holdings summed across depository institutions (line 10), life insurance companies (line 15), and individuals and others (line 78). Total holdings are the sum of these series as well as farm mortgage holdings of depository institutions (line 11), life insurance companies (line 16), and individuals and others (line 79). Quarterly shares of these seasonally adjusted series relative to residential mortgage debt outstanding are then applied to the monthly frequency series for seasonally adjusted residential mortgage debt outstanding from Fieldhouse, Mertens, and Ravn (2018). Note that holdings of individuals and others include that of mortgage companies, real estate investment trusts, state and local credit agencies, state and local retirement funds, noninsured pension funds, credit unions, and finance companies. Direct mortgage debt holdings exclude holdings of agency mortgage pools.

Figure 2.4: Monthly data on residential mortgage originations by sector for January 1970–December 1997 are from the U.S. Department of Housing and Urban Development's SMLA. Residential mortgage originations are the sum of

originations for one- to four-family homes (Table 1: Originations of 1-4 Family Homes) and multifamily homes (Table 2: Originations of Loans for Multifamily Properties). Net residential mortgage acquisitions are the sum of total mortgage originations, home mortgage purchases (Table 6A: Purchases of Loans for 1-4 Family Nonfarm Homes), and multifamily purchases (Table 7A: Purchases of Loans for Multifamily Residential Properties) net of total home mortgage sales (Table 6B: Sales of Loans for 1-4 Family Nonfarm Homes) and multifamily mortgage sales (Table 7B: Sales of Loans for Multifamily Residential Properties). Each series is seasonally adjusted using the Census Bureau's X-13 program. Nonesidential mortgage originations are the total of long-term nonfarm nonresidential loan originations, including farm and nonfarm nonresidential mortgages but excluding construction and land loans (Table 3: Originations of Nonfarm Nonresidential Loans). Construction loans are the total of originations for construction loans for all properties except land (Table 5B: Originations of Mortgage Loans for All Properties (Except Land)). Each series is seasonally adjusted using the Census Bureau's X-13 program.

Figure 2.5: Monthly data on agency medium- and long-term notes and bonds outstanding are compiled from several sources. Debt of Fannie Mae and the Federal Home Loan Bank System prior to October 1962 is from the Federal Reserve Board Banking and Monetary Statistics, 1941–1970, series "Debt of Federally Owned and Government-Sponsored Corporations (in millions of dollars), Secondary Market Operations." Outstanding debt of all three agencies is from various issues of the *Federal Reserve Annual Statistical Digest* and *Federal Reserve Bulletin*, series "Federal and Federally Sponsored Credit Agencies, Debt Outstanding," "Debt of Federal and Federally Sponsored Credit Agencies," or "Major Balance Sheet Items of Selected Federally Sponsored Credit

Agencies." Partially incomplete time series for 2003–2005 are from the Statistical Supplement to the *Federal Reserve Bulletin*, series "Federal and Federally Sponsored Credit Agencies, Debt Outstanding." Data for Fannie Mae since January 2006 are from the Fannie Mae Monthly Report, "Table 7. Debt Activity." Data for Freddie Mac since December 2007 are from the Freddie Mac Monthly Volume Summary, series "Table 5. Debt Activities." Data for the FHLBanks since January 2008 are from the FHLBS Office of Finance, Monthly Issuance Data Archive, available at `http://www.fhlb-of.com/ofweb_userWeb/resources/fhlbanalystdata_archive.xlsx`. Missing data for 2002–2007 are interpolated by Kalman smoothing in a VAR/state space model estimated by maximum likelihood as in Shumway and Stoffer (1982). End of quarter debt outstanding for Freddie Mac and the FHLBS for 2006 and 2007 are from the Annual Report of the Federal Housing Finance Agency. Missing observations for Fannie Mae's debt for various months of 2005 are first imputed from a VAR system with the following variables: monthly growth of Fannie Mae's debt, net mortgage purchases, gross mortgage holdings, and MBS pool issues; monthly growth of mortgage debt outstanding; the 10-year Treasury yield; and housing starts. The VAR system is estimated over a monthly sample over January 1972–December 2014 with a lag length of six months. Missing observations for Freddie Mac's debt for various months over 2002–2007 are estimated with an analogous VAR system that instead uses monthly growth of Freddie Mac's debt, net mortgage purchases, gross mortgage holdings, and MBS pool issues. Missing observations for the FHLBS's debt for various months over 2005–2007 are imputed from a VAR system with the following variables: monthly growth of FHLBS debt, quarter-on-quarter growth of FHLBS advances outstanding, monthly growth of mortgage debt outstanding, the 10-year Trea-

sury yield, and monthly growth in FHLMC's debt outstanding and mortgage holdings. The VAR system is again estimated over a monthly sample from January 1972 through December 2014 with a lag length of six months. Each smoothed series for agency debt is then seasonally adjusted using the Census Bureau's X-13 program, and "Housing GSE debt" is the monthly sum of the three seasonally adjusted series for Fannie, Freddie, and the FHLBS.

Monthly data for Fannie Mae's MBS outstanding for 1998–2000 and 2006–2017 are from Fannie Mae's Monthly Summary Highlights reports. Missing end-of-quarter observations for 1992–2002 are from Fannie Mae's annual Information Statements and quarterly updates, while missing end-of-quarter observations for 2003–2006 are from Fannie Mae's 10-K and 10-Q forms, cross-referenced with the Financial Statistics of the United States. Remaining end-of-quarter observations are from the Financial Statistics of the United States. Monthly data for Freddie Mac's MBS outstanding 1998-2018 are from Freddie Mac's Monthly Volume Summary reports. End-of-quarter observations prior to 1998 are from the Financial Statistics of the United States. End-of-quarter observations for Ginnie Mae's MBS outstanding are from the Financial Statistics of the United States. All missing monthly observations are constructed by linear interpolation of monthly MBS pool issues for each agency and implied quarterly repayment rates. The final monthly data series for each agency has been seasonally adjusted using the Census Bureau's X-13 program. Monthly data for Fannie Mae, Freddie Mac, and Ginnie Mae net pool issues are from Fieldhouse, Mertens, and Ravn (2018). GSE MBS outstanding and GSE pool issues are the sum of MBS outstanding and net pool issues, respectively, for both Fannie Mae and Freddie Mac.

Figure 2.6: The following seasonally adjusted balance sheet items for all domestic commercial banks are from the Federal Reserve Board of Governors' historical series on Assets and Liabilities of Commercial Banks in the United States (Table H.8): bank credit (line 1); total securities in bank credit (line 2); Treasury and agency securities (line 3); other securities (line 6); loans and leases in bank credit (line 9); commercial and industrial loans (line 10); real estate loans (line 11); and consumer loans (line 20). Real estate loans include home mortgages, revolving home equity loans, and commercial real estate loans. Consumer loans include credit cards, auto loans, student loans, personal loans, and other forms of revolving credit. Treasury and agency securities include all liabilities of the U.S. Treasury Department, other U.S. government agencies, and U.S. government-sponsored enterprises. Bank credit is the sum of all securities, loans, and leases, less allowances for loan and lease losses.

Figure 2.7: Monthly data series on construction spending are from the U.S. Census Bureau's Value of Construction Put in Place Survey. Seasonally adjusted data for 1993 and onward are from the Census, available at `https://www.census.gov/construction/c30/historical_data.html`. Older series are constructed from digitized PDFs of historical monthly Value of Construction Put in Place Survey reports, obtained through the Hathi Trust Digital Library, using Abbyy Finereader optical character recognition software; the hand constructed data series are seasonally adjusted using the Census Bureau's X-13 program.

Figure 2.8: Construction sector employment, total nonfarm employment, and financial activities employment are from the Federal Reserve Bank of St. Louis's FRED database (series USCONS, PAYEMS, and USFIRE). All series are

seasonally adjusted.

Figure 2.9: The conventional mortgage rate and FHA mortgage rate are from Fieldhouse, Mertens, and Ravn (2018), and both spreads are calculated relative to the 10-year Treasury yield. The conventional mortgage rate is largely based on the average commitment rate on 30-year fixed-rate conventional conforming mortgage from Freddie Mac's primary mortgage market survey. The FHA mortgage rate reflects 30-year fixed-rate FHA-guaranteed mortgages based on data publicly available from the Department of Housing and Urban Development. William English provided data on business loan rates. The bank prime loan rate is from the Federal Reserve Bank of St. Louis's FRED database (series MPRIME). Both business loan rate spreads are calculated relative to the effective federal funds rate. The benchmark rates are from the Federal Reserve Bank of St. Louis's FRED database (series GS10 and FEDFUNDS).

Figure 2.10: The retained portfolios of FNMA and FHLMC include both whole loans and MBS held on balance sheet, but exclude the guarantee book of off-balance-sheet MBS. Data for FNMA and FHLMC for 1968Q1–2014Q4 is from Fieldhouse, Mertens, and Ravn (2018), with subsequent updates from Fannie Mae's Monthly Summary Highlights reports and Freddie Mac's Monthly Volume Summary reports. Total agency holdings is the sum of holding by FNMA, FHLMC, GNMA, U.S. Treasury Department, Federal Reserve, Federal Home Loan Bank System (FHLBS), Federal Housing Administration (FHA), Veterans Administration (VA), Farmers Home Administration (FmHA), Federal Land Banks, Resolution Trust Corporation (RTC), Federal Deposit Insurance Corporation (FDIC), and Federal Savings and Loan Insurance Corporation (FSLIC). Data for the FHLBS for 1968Q1–2014Q4 are from Fieldhouse, Mertens,

and Ravn (2018), with subsequent updates from the FHFA's Annual Report to Congress for FHLBS holdings. Data for GNMA for 1968Q1–2014Q4 is from Fieldhouse, Mertens, and Ravn (2018), with subsequent updates from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54). All quarterly data for other government agency holdings are also from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding.

Residential mortgage debt growth is forecast by estimating a VAR system largely based on variables forecast at a quarterly frequency in the Congressional Budget Office's (CBO) Economic Outlook. The VAR system includes the log differences of real residential mortgage debt, GDP, residential fixed investment, personal income, and a trend of mortgage debt held in private-label MBS, the federal funds rate, 10-year Treasury yield, log differences of the CPI and a home price index, and the unemployment rate. Personal income is deflated using CPI-U. The home price index is constructed from the FHFA Purchase Only House Price Index for 1990 onward, spliced together with quarterly average growth in the Freddie Mac House Price Index (FMHPI) for repeat transactions post-1975 and the home purchase component of the BLS Consumer Price Index (series PHCPI from FRED) pre-1975, as in Fieldhouse, Mertens, and Ravn (2018). The trend in private-label MBS is calculated by fitting a fourth degree polynomial to the Private mortgage conduits component of the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding; the inclusion of this series is meant to explain (or absorb) some of the anomalous subprime mortgage lending boom and home price bubble of the aughts. The VAR system is estimated over a quarterly sample for 1957Q1–2017Q3 with a lag length of eight quarters, as selected by the Akaike Information Criterion. Growth in residen-

tial mortgage debt outstanding is then iteratively forecast for 2017Q4–2027Q4 using the fitted values and the CBO's economic forecast, which includes quarterly forecasts for all other variables in the VAR system save trend growth in private-label MBS, which is simply zeroed out.

FNMA and FHLMC holdings are projected in line with current policy for their portfolio caps, each indefinitely fixed at $250 billion (in nominal dollars). The Federal Reserve's MBS holdings are projected as described for Figure B.2. Holdings of the RTC, FDIC, and FSLIC are fixed at zero, as these mortgage holdings of public resolution utilities only bulge historically in response to waves of bank failures. Holdings of GNMA, FHLBS, and all other government agencies are held fixed at their stable, 2.2% average share of mortgage debt outstanding over 2011Q1–2016Q4.[29]

Figure B.1: Agency MBS outstanding are constructed as detailed for Figure 2.5. The retained portfolios of Fannie Mae and Freddie Mac include both whole loans and MBS held on balance sheet, but exclude the guarantee book of off-balance-sheet MBS. Data for 1968Q1–2014Q4 is from Fieldhouse, Mertens, and Ravn (2018), with subsequent updates from Fannie Mae's Monthly Summary Highlights reports and Freddie Mac's Monthly Volume Summary reports. The sequence of conservatorship portfolio caps are calculated from the original Senior Preferred Stock Purchase Agreements (dated 9/26/2008) and the third amendment to the Senior Preferred Stock Purchase Agreements (dated 8/17/2012), both of which are available from the Federal Housing Finance Agency: `https://www.fhfa.gov/Conservatorship/`.

[29]Combined holding of these agencies have ranged from 2.13% to 2.21% of total residential mortgage debt outstanding over this period. Projecting forward, fixing holdings at this share is meant to reflect a continuation of current policy for these agencies.

Figure B.2: In the left panel, the Fed's monthly holdings of agency MBS are based on the Federal Reserve Board of Governors' Release: H.4.1 Factors Affecting Reserve Balances, retrieved at an end-of-month basis from the FRED database of the Federal Reserve Bank of St. Louis (series MBST). Projections for agency MBS holdings during balance sheet normalization apply the maximum monthly reductions from the Federal Reserve Bank of New York's Monthly Caps on SOMA Securities Reductions for Agency Securities, available at `https://www.newyorkfed.org/markets/opolicy/operating_policy_170920`. The first reductions were announced on October 13, and the settlement date has lagged by one month, so the first reductions in portfolio holdings are assumed to take effect in November 2017, measured from end-of-October holdings.

In the right panel, the Fed's monthly net purchases of agency MBS are separately aggregated from microdata on all purchase and sale transactions, by either trade date or settlement date. Purchases for QE1 are available from the Federal Reserve Board of Governor's Agency Mortgage-Backed Securities (MBS) Purchase Program: `https://www.federalreserve.gov/regreform/reform-mbs.htm`. Subsequent purchases for the reinvestment of principal and QE3 are available from the Federal Reserve Bank of New York's Agency MBS Historical Operational Results and Planned Purchase Amounts: `https://www.newyorkfed.org/markets/ambs/ambs_schedule.html`. The original portfolio caps for each GSE were set at $850 billion as of December 31, 2009, to be reduced 10% each subsequent December 31 until reaching $250 billion. The original portfolio caps for each GSE were set at $850 billion as of December 31, 2009, to be reduced 10% each subsequent December 31 until reaching $250 billion. The current caps reflect the upwardly

revised cap of $900 billion for December 31, 2009, as well as the downwardly revised $650 billion cap for December 31, 2012, and a subsequent reduction at an accelerated rate of 15% annually.

Figure B.3: The not cyclically motivated GSE policy events are the policy changes affecting Fannie Mae and Freddie Mac from the Fieldhouse and Mertens (2017) narrative, as listed in Table B.1, with the quantified dollar effect on retained portfolio activity aggregated to a monthly frequency. In the left panel, the not cyclically motivated GSE policy events are scaled to the average combined retained portfolios of Fannie and Freddie over the previous year, as described for Figure B.1. In the right panel, the not cyclically motivated GSE policy events are scaled to annualized mortgage originations over the previous year, using the same series for seasonally adjusted residential mortgage originations as described for Figure 2.2. The detrended growth in the GSEs' retained portfolios measures the log transformed combined retained portfolio of Fannie and Freddie using the same series as described for Figure 2.2, deflated using the core PCE price index, and detrended using the linear forecasting method proposed by Hamilton (forthcoming).

Figure B.4: Data sources are as detailed for the first-stage regressions for Figure 2.2.

Figure B.5: Data sources are as detailed for Figure 2.2.

Figure B.6: The series for depository institutions' direct holdings of mortgage debt are constructed from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54). The quarterly series for depository institutions' holdings of one- to four-family home mortgages ("One-

to four- family residences," line 8), multifamily mortgages ("Multifamily residences," line 9), commercial mortgages ("Nonfarm, nonresidential," line 9), and farm mortgages ("Farm," line 11) are seasonally adjusting using the Census Bureau's X-13 program. The series for life insurance companies' direct holdings of mortgage debt are constructed from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54). The quarterly series for life insurance companies' holdings of one- to four-family home mortgages ("One- to four- family residences," line 13), multifamily mortgages ("Multifamily residences," line 14), commercial mortgages ("Nonfarm, nonresidential," line 15), and farm mortgages ("Farm," line 16) are seasonally adjusting using the Census Bureau's X-13 program. The series for mortgage holdings of individuals and others are constructed from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54). The quarterly series for individuals' and others' holdings of one- to four-family home mortgages ("One- to four- family residences," line 76), multifamily mortgages ("Multifamily residences," line 77), commercial mortgages ("Nonfarm, nonresidential," line 78), and farm mortgages ("Farm," line 79) are seasonally adjusting using the Census Bureau's X-13 program.

Quarterly shares of these seasonally adjusted series relative to residential mortgage debt outstanding are then applied to the monthly frequency series for seasonally adjusted residential mortgage debt outstanding from Fieldhouse, Mertens, and Ravn (2018). Holdings of depository institutions include commercial banks, savings banks, and savings and loan associations. Holdings of individuals and others include that of mortgage companies, real estate investment trusts, state and local credit agencies, state and local retirement funds, noninsured pension funds, credit unions, and finance companies. Direct mortgage

debt holdings exclude holdings of agency mortgage pools.

Figure B.7: Historical data on foreign net purchases of agency bonds and securities are from the U.S. Treasury Department's Treasury International Capital Monthly Reports on Cross-Border Portfolio Financial Flows, available at `https://www.treasury.gov/resource-center/data-chart-center/tic/Pages/ticsec.aspx`. These flow series are not seasonally adjusted, as they proved overly problematic for the Census Bureau's X-13 program, either in raw flows and cumulated levels. Note that agency bonds and securities include mortgage-backed securities, and net purchases exclude principal payments distributed to holders prior to redemption. Foreign official holdings include those of central banks, sovereign wealth funds, and multinational organizations.

Figure B.8: Building permits for new private housing units, housing starts for privately owned single-unit homes, and new sales of single-unit homes are from the Federal Reserve Bank of St. Louis's FRED database (series PERMIT, HOUST1F, and HSN1F). All series are expressed in seasonally adjusted annual rates.

Tables B.2 and B.3: Data are constructed as detailed for Figures 2.3 and 2.7.

Tables B.4 and B.5: Indices for interstate and intrastate bank regulation are constructed as the annual population-weighted share of states having enacted deregulation, based on the deregulation dates provided by Mian, Sufi and Verner (2017). Average marginal tax rate series are from Mertens and Montiel Olea (2018). The conventional monetary policy shock series is the Romer and Romer (2004) measure of intended changes to the federal funds rate orthogo-

nalized to Greenbook forecasts of inflation, unemployment, and GDP growth.

Tables B.6 and B.7: Annual data for the conforming loan limit data is constructed from various acts of Congress (before the loan limit was indexed to home prices) and Federal Housing Finance Agency Data, available at `https://www.fhfa.gov/DataTools/Downloads/Pages/Conforming-Loan-Limits.aspx`. GSE portfolio growth is measured from data constructed as described for Figure 2.2. GSE agency MBS growth is measured from data constructed as described for Figure 2.5.

Figure B.9: Data sources for variables in the benchmark SVAR specification are as follows: the Gilchrist and Zakrajšek (2012) updated option-adjusted EBP is from Simon Gilchrist's webpage, available at `http://people.bu.edu/sgilchri/Data/data.htm`. Monthly seasonally adjusted series for industrial production, privately owned housing starts, the consumer price index for all urban consumers (CPI-U), federal funds rate, and 10-year Treasury yield are from FRED (series INDPRO, HOUST, CPIAUCSL, FFR, and GS10, respectively). Data on real mortgage originations and real GSE net purchases are as described for Figure 2.2. The conventional mortgage spread is constructed as the conventional mortgage rate series, as described for Figure 2.2, less the 10-year Treasury yield. The cumulated Fama and French market excess returns index is based on the Rm-Rf series of the Historical Fama/French Benchmark Factors, retrieved from Ken French's data library, available at `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`; their index is calculated as the value-weighted return on all stocks listed on the NYSE, AMEX, and NASDAQ less one-month Treasury yields.

Data sources for additional variables rotated into the SVAR framework, as

discussed in Section B, are as follows: monthly seasonally adjusted series for privately owned housing starts for single-unit structures, housing starts for structures with five unites or more, personal consumption expenditure, and the civilian unemployment rate are from FRED (series HOUST1F, HOUST5F, PCE, and U6, respectively). Data series for real GSE mortgage holdings are as described for Figure 2.2, for real agency MBS outstanding as described for Figure B.1, and for the real home price index as described for Figure 2.2. Data series for real home mortgage debt outstanding, real multifamily mortgage debt outstanding, and real commercial mortgage debt outstanding are constructed from the Federal Reserve Board of Governors' historical series on Mortgage Debt Outstanding (Table 1.54). The quarterly series for total mortgage debt outstanding ("All holders," line 1), one- to four-family home mortgages ("One- to four- family residences," line 2), multifamily mortgages ("Multifamily residences," line 3), and commercial mortgages ("Nonfarm, nonresidential," line 4) are seasonally adjusting using the Census Bureau's X-13 program. Quarterly shares of these seasonally adjusted series relative to residential mortgage debt outstanding (for one- to four-family homes and multifamily homes) are then applied to the monthly frequency series for seasonally adjusted residential mortgage debt outstanding. All mortgage lending series have been deflated using the core PCE price index. The measure of cumulated GSE excess stock returns is from Fieldhouse, Mertens, and Ravn (2018) and is constructed as a geometrically weighted average of stock returns for Fannie Mae and Freddie Mac less the Fama and French market returns series, Rm, of the Historical Fama/French Benchmark Factors, retrieved from Ken French's data library, which is available at `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`.

Figure B.10: Data are constructed as detailed for Figure B.9.

Figure B.11: The Fed's purchases of agency MBS are as described for Figure B.2. Monthly time series for the Fed's purchases of Treasury securities are constructed from the New York Fed's Open Market Operations Transaction Data, available at `https://www.newyorkfed.org/markets/omo_transaction_data.html`. The monthly data series for agency MBS held by third parties is constructed as total agency MBS outstanding, as described for Figure B.1, less Fannie Mae's and Freddie Mac's holdings of their own and other agency MBS, compiled from Fannie's Monthly Summary Highlights reports and Freddie's Monthly Volume Survey reports, respectively. The federal funds rate is the effective federal funds rate from FRED (series FEDFUNDS). Data sources for all other lagged controls are as described for Figure 2.2 or Figure B.9.

The QE event indicator series include the following dates: September 2008 for GSE conservatorship and launch of the U.S. Treasury Department's agency MBS purchase program; November 2008 for the November 25 FOMC statement and launch of QE1; December 2008 for Chairman Bernanke's December 1 speech and the December 16 FOMC statement; January 2009 for the January 28 FOMC statement; March 2009 for the March 18 FOMC statement and expansion of QE1; August 2010 for the August 10 FOMC statement announcing reinvestment of principal payments in long-term Treasuries; September 2010 for the September 21 FOMC statement; November 2010 for the November 3 FOMC statement and launch of QE2; September 2011 for the September 21 FOMC statement announcing reinvestment of principal payments from agency MBS and debt into agency MBS; September 2012 for the September 13 FOMC statement and launch of QE3; December 2012 for the December 12 FOMC statement and expansion of QE3;

December 2013 for the December 18 FOMC statement and tapering of QE3; October 2014 for the October 29 FOMC statement and the termination of QE3; and September 2017 for the September 20 FOMC statement and launch of balance sheet normalization policies.

APPENDIX C

APPENDIX TO CHAPTER 3

Federal National Mortgage Association, 1934–1967

This appendix provides an overview of major legislative and regulatory changes affecting Fannie Mae prior to enactment of the Housing and Urban Development Act of 1968.

National Housing Act of 1934 (Pub. L. 73-479)

Enacted: June 27, 1934

The Act established the legal basis for privileged national mortgage associations, and in doing so, for the subsequent chartering of FNMA in 1938. Act also created the Federal Housing Administration (FHA), to be run by the Federal Housing Administrator, as an independent agency, in order to stimulate the construction sector and employment and to improve housing standards. Section 203 of the Act established a system of FHA insurance for qualifying home mortgages deemed socially or economically desirable, and Section 207 authorized a more flexible program for insuring mortgages for low-income housing.

Before the Great Depression, most mortgages were short-term loans of only up to five years, required large down payments, with LTVs not exceeding 60%, and were not self-amortizing (Elliot (2013), pp. 9-10); borrowers would take out a new mortgage to make their final ballon principal repayment, but this financing system imploded when panicked or failing banks stopped making new loans. The new FHA-insured loans initially imposed maximum LTVs, loan maturities, interest rates, and loan values of 80%, 20 years, 5%, and $16,000, respec-

tively, a considerable deviation from the prevailing industry norm. Congress again loosened these FHA loan requirements in 1938 in order to "*support the housing market during ongoing weakness*" (Elliot (2013), p. 10).

Title III of the Act authorized and empowered the the Administrator "*to provide for the establishment of national mortgage associations*" which would be authorized "*(1) to purchase and sell first mortgages and such other first liens as are commonly given to secure advances on real estate...*" provided the liens had a loan-to-value-ratio of no more than 80% upon their purchase date, and "*(2) to borrow money for such purposes through the issuance of notes, bonds, debentures, or other such obligations as hereinafter provided*" with obligations not to exceed ten times its capital stock or the current value of assets. Investments were to be restricted to mortgage assets, cash and deposits on hand, and Treasury securities. The minimum capital stock subscription for incorporation of a national mortgage association was set at $5 million.

The Administration and Congress had intended the National Housing Act of 1934 to induce the incorporation of legally privileged private national mortgage associations, subject to federal supervision but distinct from government agencies (Haar (1960), p. 78). The associations were to be granted special privileges to induce their incorporation, including exemption from state taxes (save property taxes) as well as unique regulatory oversight limited to the Administrator. According to Haar (1960), the intended purpose of the associations was to accustom "*the financial and banking communities to what then appeared a radical new financing device–the FHA mortgage, which the act also created.*" (Haar (1960), p. 76).

Amendments to Reconstruction Finance Corporation Act (Pub. L. 74-1)

Enacted: January 31, 1935

With the objective of reestablishing a normal mortgage market, the Act amended the Reconstruction Finance Corporation's (RFC) charter to authorize stock subscriptions and loans for the stock subscriptions of national mortgage associations, or any other similar financial institutions primarily in the business of making residential mortgage loans. RFC lending and stock subscriptions under this authorization was capped at $100 million.

Under this new authority, the RFC Mortgage Company was incorporated by the RFC on March 14, 1935, intended to support a secondary market for FHA-insured mortgages. The RFC provided an initial capital stock purchase of $10 million, and purchased an additional $5 million worth of capital stock in 1936Q3. Between 1935 and 1947, the RFC authorized $373.4 million worth of loans to the RFC mortgage company, and disbursed $334.9 million of loans. Loans outstanding to the RFC peaked at $118.8 million in 1944Q2 (Department of the Treasury (1959), Table MS-2, p. 261).

Amendments to the National Housing Act (Pub. L. 74-76)

Enacted: May 28, 1935

In a further effort to induce the private incorporation of national mortgage associations, the Act reduced the minimum capital stock required for such associations from $5 million to $2 million and increased their permissible leverage ratios from ten to twelve times their capital stock.

National Housing Act Amendments of 1938 (Pub. L. 75-424)

Enacted: February 3, 1938

The 1938 amendments to the National Housing Act of 1934 expanded the struggling FHA mortgage insurance programs to cover certain low principal loans with maturities of up to 25 years and LTVs of up to 90 percent. In doing so, the Act set in motion the creation of a federal mortgage association, as it was understood that assistance would be needed to launch such foreign mortgage contracts (Haar (1960), p. 80). The Act also amended Title III of the National Housing Act to increase federal national mortgage associations' permissible leverage ratios from twelve to twenty times their capital and surplus, and reduced the $2 million stock subscription requirement from being fully paid in to only 25% paid in upfront. And in a last attempt to encourage private incorporation, the Act exempted national mortgage associations from all federal taxation in addition to state taxes (again save property tax). After enactment, a last effort by the FHA again proved unsuccessfully in luring private capital into a secondary market for FHA mortgages.

The RFC had been trying to incentivize the incorporation of private mortgage associations, and had been authorized to subscribe to common stock, but "*RFC policy had been to offer to buy preferred, leaving to the private investor both profit and risk. This same stock purchase plan had proved successful in the commercial banking area, but no one appeared willing to accept the risks and profits entailed in mortgage banking.*" (Haar (1960), p. 80). At the president's request, the National Mortgage Association of Washington was chartered by the RFC on February 10, 1938, as a wholly owned RFC subsidiary. The Association was re-designated the Federal National Mortgage Association in April 1938. According to Haar (1960), the original purpose of FNMA was twofold: "*First, it rendered the new FHA mortgages more desirable by offering an assured market to institutions concerned with liquidity. The psychological factor was important here: that FNMA was available*

was sufficient to lure into the mortgage market many institutions that actually made little or no use of FNMA. Second, as anticipated, FNMA facilitated the geographical spreading of mortgage capital" (Haar (1960), p. 83).

Pursuant to the amendments, the RFC provided $10 million in paid-in capital and $1 million in surplus; Fannie was authorized to borrow up to twenty times that cumulative amount, so RFC's capitalization of Fannie could support a mortgage portfolio of $231 million (Haar (1960), p. 82 and Klaman (1961), p. 218). Purchases were limited to FHA mortgages and were first made on May 5, 1938. The mortgage portfolio grew rapidly, rising to $80 million by the end of 1938 and $144 million by the end of 1939, before subsequently slowing due to war restrictions on building activity (Klaman (1961), p. 220, Bartke (1971)).

FNMA was chartered and initially capitalized by the US government in the midst of the recession that lasted from May 1937 through June 1938. The accompanying Senate Committee on Banking and Currency report characterized the Act's objective as "*to encourage the private construction and financing of housing on a large scale... in wrestling with the inseparable problems of unemployment relief, economic recovery, and Budget balancing*" and "*to utilize the best available means for achieving a sustained long-term residential construction program with a minimum expenditure of Federal funds and a maximum reliance upon private business enterprise*" (Senate Committee on Banking and Currency (1937), pp. 1, 4). Similarly, Klaman (1961) noted that FNMA was originally charted "*against a background of federal efforts to stimulate housing construction, building materials production, and mortgage investments following the unprecedented decline during the Great Depression,*" (Klaman (1961), p. 217).

National Housing Act Amendments of 1941 (Pub. L. 77-24)

Enacted: March 28, 1941

The amendments to the National Housing Act added Title VI–Defense Housing Insurance, which authorized FHA insurance on more generous terms in critical defense areas. The amendments also authorized Fannie to purchase FHA mortgages insured under Title VI. Fannie's overall purchase authorization did not change.

1948 Amendments to the National Housing Act and Servicemen's Readjustment Act (Pub. L. 80-864)

Enacted: July 1, 1948

Shortly after the GI Bill of 1944 authorized a VA mortgage guarantee program, the RFC Mortgage Company was tasked with supporting a secondary market for those loans (Pub. L. 696-79, enacted August 7, 1946). Congress, however, disbanded the RFC Mortgage Company the following year, and, along with it, all secondary mortgage market support for VA-guaranteed loans (Pub. L. 132-80, enacted June 30, 1947). The need for a secondary market was quickly made apparent, and strongly influenced the drafting of the housing amendments of 1948 (Haar (1960), pp. 88-90). VA loans had been declining, aggravated by a widening spread between their fixed 4% rate and market interest rates, so Congress amended Fannie's charter in a manner intended to stimulate their flows (Klaman (1961), p. 54).

The Act reorganized Fannie Mae under a new charter and prohibited the formation of private mortgage associations envisioned in the National Housing Act of 1934. It authorized secondary market purchases of VA-guaranteed mortgages with restrictions, although none were purchased until fiscal year (FY)

1950 (Bartke (1971), p. 21). The principle balance for an eligible mortgage was restricted to $10,000, which was lower than the FHA insurance limit of $16,000 (FNMA (1969), p. A38). The amended charter, however, only permitted FNMA to purchase up to one-quarter of the FHA or VA loan value originated by the lender.

In anticipation of Fannie's expansion into the VA market, the Act also increased FNMA's capitalization by $10 million to $21 million (again provided by the RFC) and raised its borrowing capacity from 20 to 40 times its capital and earned surplus.

The accompanying committee report emphasized the need for a permanent secondary market for VA mortgages, the principal reason for the passage of the 1948 Amendments (Haar (1960), p. 90). Between FNMA's first reorganization by the Act and a second reorganization under the National Housing Act of 1954 (Pub. L. 83-560), FNMA principally served as "*special support for government sponsored housing and mortgage programs, which were not acceptable in private financial markets*," and VA mortgages accounted for the bulk of purchases (Klaman (1961), p. 220).

Housing Act of 1948 (Pub. L. 80-901)
Enacted: August 10, 1948

The Act loosened a restrictive provision in FNMA's recently amended charter to allow Fannie to purchase up to half of the FHA or VA loan value originated by the lender, which had been capped at one-quarter of the loan by the July 1948 housing amendments (Pub. L. 80-864). According to Klaman (1961), "*the intended stimulus [to VA loans] was largely nullified*" by the purchase limitation

of only up to one-fourth of VA and FHA loans, hence the subsequent loosening shortly after enactment of the 1948 amendments (Klaman (1961) p. 54). The restriction would be fully repealed just over a year later.

Public Law 81-176

Enacted July 19, 1949

On July 6, 1949, FNMA approached so close to reaching its borrowing limit that it was forced to suspend further commitments to purchase mortgages. This was a blow to the VA-guaranteed mortgage market, and Congress promptly increased FNMA's authorization (Haar (1960), p. 92). The bill replaced Fannie's standing leverage restrictions with a flat limit of $1.5 billion on the total volume of assets and commitments outstanding (FNMA (1969), p. C2), to the effect of increasing Fannie's purchase capacity by roughy $500 million.

Private mortgage finance was particularly weak in 1949, and VA loans bore the brunt of reduced lending (Klaman (1961), p. 113). The increase in FNMA's portfolio limit was made midst of the recession that lasted from November 1948 through October 1949. The January 1950 Economic Report of the President argued that further stimulus was needed to stabilize housing production, viewing the "*maintenance of a high and growing level of private investment in housing as perhaps the most important issue in connection with the maintenance of a total level of investment high enough to support maximum employment and production over the next few years*" (Economic Report of the President (1950), p. 93). The bill was intended as a stopgap measure, as the Senate Banking and Currency Committee stated that it intended to consider more permanent legislation (Haar (1960), p. 93).

National Housing Act Amendments of 1949 (Pub. L. 81-211)

Enacted: August 8, 1949

The amendments to the National Housing Act added Title VIII–Military Housing Insurance, meant to encourage construction of rental housing for military and defense areas. The FHA's Title VI program for critical defense areas had been repealed one year earlier. The Act also authorized Fannie to purchase FHA mortgages insured under Title VIII, while Fannie's overall purchase authorization was unchanged.

Public Law 81-387

Enacted: October 25, 1949

By September 30, 1949, the remaining capacity from July's increased purchase authorization of $500 million had dwindled to $149 million (Haar (1960), p. 93). Market interest rates were rising, and the 4% interest rate ceiling on VA loans was preventing the attraction of adequate private capital. Congress's answer was to continue to pump money into Fannie. Public Law 81-387 increased FNMA's authorization by $1 billion to a total of up to $2.5 billion, and removed some restrictions on the purchase of VA loans, including the 50% limitation on purchases of mortgagees' holdings. RFC funding was correspondingly increased by $1 billion. In practice, Fannie fast again neared its statutory limits and stopped issuing commitments in March 1950.

The increase in FNMA's portfolio limit was made at the tail end of the recession that lasted from November 1948 through October 1949. The January 1950 Economic Report of the President framed housing policy and the desire to increase residential investment as important stimulus for supporting full em-

ployment (see above).

Housing Act of 1950 (Pub. L. 81-475)

Enacted: April 20, 1950

Lending through Fannie and the RFC could not continue to expand indefinitely. In the 1951 Budget, President Truman stated: "*The continuing need for a stand-by secondary market does not mean that Government purchases should be regarded as a permanent substitute for private financing. Accordingly, the administration of this program will be directed toward encouraging private lenders to hold a larger portion of these mortgages as well as to repurchase the mortgages previously sold to the Federal Government*" (Budget for Fiscal Year 1951, p. M-51). But it was projected that Fannie's standing $2.5 billion authorization would be exhausted by July 1950, and the President recommended an additional $500 million in public debt authorizations for FY1950 and $250 million for FY1951, to carry through on the large volume of commitments already outstanding.

The Housing Act of 1950 eventually increased FNMA's portfolio authorization by $250 million to $2.75 billion, short of the increase proposed by the President. The Act also expanded eligibility for Fannie's purchases to include FHA mortgages insured under Section 8 (low cost housing) and Section 213 (cooperative housing) of the National Housing Act. Lastly, FNMA was authorized to charge mortgagees a fee of 1% of the amount of a mortgage purchased.

In order to stop Fannie's uncontrolled growth, the Act simultaneously limited purchases to mortgages guaranteed or insured at the time of the contract, with the effect of revoking authority to issue advance commitments to purchase mortgages. This ban on advanced commitments, however, was short

lived. Public Law 81-243, enacted October 30, 1950, allowed $30 million of advance commitments outstanding at any time for the specific relief of veterans who had obtained FHA commitments but could not get mortgages following the ban (Haar (1960), p. 67). The Defense Housing and Community Facilities and Services Act (Public Law 82-139), enacted September 1, 1951, restored advance commitments authorization to $200 million outstanding for purchase of mortgages backed by "emergency" housing in critical defense areas, disaster areas, and for military use housing under Title VIII of the National Housing Act. Public Law 82-309, enacted April 9, 1952, increased advance commitments authorization by $52 million to $252 million outstanding at any given time.

Reorganization Plan No. 22 of 1950.

Approved: June 20, 1950

This presidential reorganization plan moved authority over Fannie Mae from the RFC to the Housing and Home Finance Agency, the overseer of the FHA at the time, effective September 7, 1950 (Bartke (1971), p. 21). The objective was to improve coordination of federal housing programs (Hagerty (2012), p. 29). There was no change in Fannie's purchase authorization.

Suspension of Non-Emergency Mortgage Purchases

Announced: April 1952

Having exhausted its funding authorization for non-defense mortgage purchases, FNMA announced in April 1952 that it was suspending all purchases of mortgages unrelated to emergency types of housing (Haar (1960), p. 99).

Housing Act of 1952 (Pub. L. 82-531)

Enacted: July 14, 1952

The Act was designed to aid military housing and increased FNMA's purchase authorization by $900 million to $3.65 billion. The increased authority could only be used to purchases related to critical defense, disaster, and military housing. Purchases of other types of mortgages, in practice mostly VA mortgages, remained limited to $2.75 billion, and were thus notionally restricted to funds available from sales, repayments, foreclosure sales, and funds held for purchases under previously issued commitment contracts. In practice, however, $600 million of former authority had been set aside for defense purposes, such that the effect was to free this amount for non-defense mortgages (Haar (1960), p. 99). According to Klaman (1961), the Act had the effect of freeing $362 million previously reserved for defense, military, and disaster housing for the purchase of other mortgages (Klaman (1961), p. 65). The Act also further expanded Fannie's advance commitment authority from $252 million to $1.152 billion. Purchases of non-emergency mortgages were resumed in September 1952.

The January 1952 Economic Report of the President indicated that government policy for 1952 would aim to *decrease* housing starts to 850,000 or less, down from 1.1 million in 1951 and 1.4 million in 1950, in order to prioritize resources for the defense industry and the escalation of the Korean conflict (January Economic Report of the President (1952), pp. 8-11). The administration was fully supportive of selective credit controls being administered by the Federal Reserve Board, pursuant to the Defense Production Act, to limit credit for housing and consumer durables. But the report also noted that "*A serious need has already appeared for additional housing and community facilities and services in defense areas*," recommending additional aid to critical defense areas beyond those recently provided (January Economic Report of the President (1952), p. 17).

The Senate Committee on Banking and Currency report accompanying the Act stated that the bill was principally intended to carry out the objectives of the Defense Housing and Community Facilities and Services Act of 1951, which was designed to assist the provision of housing for military personal and defense workers in critical areas for the war effort. It was also reported that private mortgage lenders perceived elevated marketability risk with these defense-related mortgages, and private loans would not be originated without FNMA advance commitments.

Housing Amendments of 1953 (Pub. L. 83-94)

Enacted: June 30, 1953

After effectively exhausting the increase in purchase authority from the Housing Act of 1952, FNMA again announced on April 10, 1953 that it was suspending purchases of non-emergency FHA/VA mortgages (Haar (1960), p. 100). The Act extended FNMA's advance commitment authorization for defense and disaster mortgages through July 1, 1954, but left overall purchase authority unchanged. But the bill repealed the restriction that no more than $2.75 billion of purchase authority be used related to mortgages other than for defense, disaster, and military housing, in effect freeing the remaining $900 million in additional authorization for purchases of non-emergency mortgages. The accompanying Senate Committee on Banking and Currency report estimated that $200 million of the $900 million authorization would probably not be needed for such purchases, and would thus be freed for over-the-counter purchases of FHA/VA mortgages when FNMA resumed such purchases (Senate Committee on Banking and Currency (1953), p. 10). FNMA quickly resumed over-the-counter purchases of non-emergency FHA/VA mortgages.

The Senate Committee on Banking and Currency Report accompanying the Act stated that the bill was principally concerned with "*amendments to the housing acts which are urgently needed and which will aid and facilitate in the maintenance of a high level of residential construction*." (Senate Committee on Banking and Currency (1953), p. 1). But the urgency of the legislative action derived from prior legislative sunsets, not economic conditions: Federal authority to make mortgage purchases and enter new commitments would have expired on June 30, the day of enactment, if the bill had not been signed into law (CQ (1954)). The report also emphasized the objective of improving housing as "*a basic factor in our ability to maintain a healthy and expanding economy.*" The August 1953 Federal Reserve Bulletin's report on residential real estate developments noted strong housing demand, record construction activity, and record real estate credit flows in the first half of the year (FRB August 1953, pp. 810–812).

Federal National Mortgage Association Charter Act (Pub. L. 83-560)
Enacted: August 2, 1954

Title II of the National Housing Act of 1954, designated the Federal National Mortgage Association Charter Act, rechartered a nearly bankrupted Fannie Mae into a three-part corporation, separating a special assistance function, management and liquidations of Fannie's existing portfolio, and secondary market operations. Fannie was separately accountable for each of these. The special assistance function was to be entirely supported by loans from the Treasury, and amounted to a direct government lending program—at the President's discretion—for certain FHA loans that were not generally acceptable to investors, primarily because of their low interest rates. Management and liquidations operations were set up to dispose of Fannie Mae's previously

amassed mortgage portfolio in an orderly fashion, although related mortgage purchases continued for many months because of prior outstanding commitments. Lastly, secondary market operations were to continue supporting the market for FHA/VA guaranteed mortgages and also serve to stabilize the mortgage market. The 1956 Budget stated that the purpose of the secondary market activities was to ensure that mortgage funds were available at market interest rates to meet normal needs in all parts of the country (Budget for Fiscal Year 1956, p. M-75). Purchases and sales were to be made only at such prices as would prevent excessive use of Fannie's secondary market facilities and permit Fannie to operate on a fully self-supporting basis.

The Act turned Fannie Mae into a mixed-ownership corporation by requiring authorized mortgagees to purchase Association common stock, while the federal government retained its preferred stock, with ownership transferred from the RFC to Treasury. Prior to this rechartering, funding for Fannie's activities came almost exclusively from the Treasury or RFC.[1] The Act also authorized Fannie to issue debt in capital markets in order to fund secondary market and management and liquidity operations. The secondary market function was granted standby powers to borrow up to $500 million from the Treasury plus the sum of repayments of principal and cancelation of commitments from the management and liquidation functions, but not to collectively exceed $1 billion. The new financing provisions envisaged an eventual full privatization of Fannie Mae, but provided neither a deadline nor mechanism for the transition (Hagerty (2012), p. 32; Haar (1960), pp. 101–125; Bartke (1971), pp. 22–29).

The Act left the total authorization for outstanding assets and commitments

[1]Between 1938 and 1950, only two relatively small series of obligations were issued to the public (FNMA (1969) p. A-13).

under previously authorized programs unchanged at $3.65 billion, but apportioned this authority across the newly separated functions. The Act limited total authorized investments, loans, purchases, and commitments under the special assistance program at $300 million.[2] Management and liquidations function were authorized up to the remaining $3.35 billion. Fannie's outstanding $3.0 billion mortgage portfolio was to be gradually liquidated and replaced with the new secondary market operations (Haar (1960), p. 110), although prior commitments forced continued purchases instead of an immediate net drawdown.

The dollar limitation on the amount of the mortgage that could be purchased under the special assistance and secondary market functions was set at $15,000 (FNMA (1969), p. A38), up from the previous $10,000 limit. Purchases were also limited to a maximum of one-half of mortgagees' VA originations and one-fourth of their FHA originations (Klaman (1961), p. 221).

To fund the new secondary market facility, $93 million in preferred stock was issued to the Treasury—equal to the sum of the initial $21 million capitalization plus accumulated earned surpluses. Authorized mortgagees were required to purchase common stock of at least 3% of the unpaid principal of mortgages sold (Klaman (1961), p. 221). The secondary market facility was authorized to issue unguaranteed debt in private capital markets up to ten times the sum of Fannie's capital, surpluses, reserves, and undistributed earnings. As purchases under the secondary market function were not subject to the prior portfolio limitations apportioned between special assistance and management and liquidations functions, obligations for secondary mortgage market could support a mortgage portfolio of up to $1.02 billion ($93 million $\times$ (10+1) = $1.02

[2]Eligible mortgages for purchase under special assistance programs included those financing housing in Alaska and Guam, housing in defense or military programs, and for victims of major disasters, cooperative housing projects, or urban renewal program housing.

billion). However, activity was not expected to approach this level very quickly, as only mortgages insured or guaranteed on or after August 2, 1954 were initially eligible for purchase.

Following this rechartering, FNMA took to issuing one-year standby commitments to purchase mortgages. Mortgagees would pay a fee for such a commitment, and mortgages would be purchased at a slight haircut relative to the going market rate. But mortgagees had the option not to call in standby commitments.

The Federal National Mortgage Association Charter Act completely overhauled Title III of the National Housing Act, and in doing so, newly established a statutory purpose for Fannie. Three subsequent landmark reforms of US federal housing credit policy would later revise Fannie's statutory purposes, and all four offer considerable insight to congressional intent and the evolution of policy priorities.[3] The FNMA Charter Act of 1954 set the following statutory purpose for Fannie (emphasis added):

"*SEC. 301. The Congress hereby declares that the purposes of this title are to establish in the Federal Government a secondary market facility for home mortgages, to provide that the operations of such facility shall be financed by private capital to the maximum extent feasible, and to authorize such facility to "(a)* ***provide supplementary assistance to the secondary market*** *for home mortgages by* ***providing a degree of liquidity for mortgage investments****, thereby* ***improving the distribution of investment capital available for home mortgage financing****; "(b) provide special assistance (when, and to the extent that, the President has determined that it is in the public interest)*

[3]The subsequent three acts were the Housing and Urban Development Act of 1968 (Pub. L. 90-448), Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (Pub. L. 101-73), and Housing and Community Development Act of 1992 (Pub. L. 102-550).

for the financing of (1) selected types of home mortgages (pending the establishment of their marketability) originated under special housing programs designed to ***provide housing of acceptable standards at full economic costs for segments of the national population which are unable to obtain adequate housing under established home financing programs****, and (2) home mortgages generally as a* ***means of retarding or stopping a decline in mortgage lending and home building activities which threatens materially the stability of a high level national economy****; and "(c) manage and liquidate the existing mortgage portfolio of the Federal National Mortgage Association in an orderly manner, with a minimum of adverse effect upon the home mortgage market and minimum loss to the Federal Government."*

Of note, the secondary market was intended as a policy mechanism to improve liquidity and redirect housing credit flows without any caveat about business or financial cycle conditions, whereas the special assistance functions were statutorily intended, at the President's discretion, to either play a countercyclical role or advance various social and/or defense housing policy objectives supporting underserved mortgage markets.

President Eisenhower's remarks upon signing the Act emphasized social policy objectives and longer-term policy goals: "*It will raise the housing standards of our people, help our communities get rid of slums and improve their older neighborhoods, and strengthen our mortgage credit system. In coming years it will also strongly stimulate the nation's construction industry and our country's entire economy... by this new law we have made a major advance toward meeting America's housing needs*" (Eisenhower (1954)).

Housing Amendments of 1955 (Pub. L. 84-345)

Enacted: August 11, 1955

The Act created two new special assistance functions, to be managed by Congress rather than executive order, for Fannie to enter commitments to purchase FHA mortgages insured under Section 213 (cooperative housing) and Section 803 (armed services housing). This new special assistance authority was limited to $50 million for cooperative housing and $200 million for armed services housing. The increased funding levels did not appear to be cyclically motivated.

Housing Act of 1956 (Pub. L. 84-1020)

Enacted: August 7, 1956

The Act repealed the limitation on total authorizations for the management and liquidations and special assistance functions set by the 1954 Charter Act, although the special assistance authority limitation was not repealed. This effectively removed the portfolio limitations for just the management and liquidations function, as secondary market functions remained limited by restriction on obligations imposed by the National Housing Act of 1954. FNMA was additionally authorized to issue one-year "standby" commitments to purchase mortgages (Klaman (1961), p. 72). The Act also authorized FNMA to lower the stock purchase requirement for mortgagee counter parties from 3 to 2%, and to 1% under limited circumstances (Klaman (1961), p. 72). Permissible secondary market purchases were loosened from mortgages at par to those 'within the range of market prices.'

Limitation on Purchases of Older Mortgages

Announced: November 1956

As part of a coordinated effort to encourage new home production, FNMA

announced in November 1956 that it would limit and reduce purchases of mortgages that had been guaranteed or insured more than four months ago (Klaman (1961), p. 72).

Pub. L. 85-10

Enacted: March 27, 1957

The Act authorized and directed Fannie to issue an additional $50 million in preferred stock, to be delivered to the Treasury, which was directed to accept said stock. The effect was to increase Treasury's preferred stock holdings of FNMA up to $142.8 million. Based on the existing cap on debt obligations of ten times capital, the injection effectively increased secondary mortgage market purchase capacity by $550 million ($50 million × (10 + 1) = $550 million). The Act additionally increased the supplemental special assistance function authorization for commitments for and purchases of Section 213 FHA-insured mortgages (cooperative housing) by an additional $50 million. The total increase in Fannie's purchase capacity was therefore $600 million. The Act also increased the limitation on Treasury's purchases of Fannie obligations to $1.35 billion.

The accompanying Senate Committee on Banking and Currency report emphasized the urgent, stopgap nature of the bill: "*[t]he purpose of the resolution is to provide immediate assistance on an interim basis to the secondary market operation of [FNMA]*" (Senate Committee on Banking and Currency (1957a), p. 1). The Committee estimated that without the "*immediate relief*" provided by the Act, FNMA's purchase program would come to an abrupt halt in early March—precisely what the bill was trying to prevent (Senate Committee on Banking and Currency (1957a), p. 2). It was noted that FNMA's secondary market facilities had come under severe strain as "*pressure upon available investment capital tight-*

ened steadily during 1956" (Senate Committee on Banking and Currency (1957a), p. 1). Lastly, the report noted that the "*the resolution is a stopgap measure*" and that the $50 million capitalization increase fell short of the administration's requested $100 million increase, intended by the administration to be a "long-term solution," but viewed as inadequate by the committee (Senate Committee on Banking and Currency (1957a), p. 3).

Housing Act of 1957 (Pub. L. 85-104)

Enacted: July 12, 1957

The Act directed Fannie to issue an additional $65 million in preferred shares to the Treasury Department, effective immediately, thereby increasing Treasury's preferred stock holdings to $207.8 million. Based on the existing cap on debt obligations of ten times capital, the authorization effectively increased secondary mortgage market purchase capacity by $715 million ($65 million $\times$ (10 + 1) = $715 million). In addition, the President's general special assistance authority was increased by $150 million to $450 million. The Act also increased the supplemental special assistance function authorization for commitments for and purchases of Section 213 FHA-insured mortgages (cooperative housing) from $100 million to $200 million and mortgages insured under Title VIII of the National Housing Act (armed services housing) from $200 million to $450 million. The total increase in Fannie's purchase authority was therefore $1.215 billion. The Act additionally increased the limitation on the Treasury's purchases of Fannie obligations by $900 million, from $1.35 billion to $2.25 billion, where it would remain until Fannie was taken into conservatorship during the Great Recession.

The accompanying committee report made clear that the increase in FNMA's

borrowing authority was motivated by temporary stabilization concerns, "*an attempt to stabilize the market for federally underwritten mortgages and to prevent the continuing decline in housing starts and applications*" (Senate Committee on Banking and Currency (1957b), p. 8). The increase in the Treasury Department's authority to lend to FNMA was viewed as complementary to increasing Fannie's borrowing capacity, and report language noted that the line of credit "*provides assurance to private investors that FNMA has available a source of liquid funds which may be used to purchase maturing debentures*" (Senate Committee on Banking and Currency (1957a), p. 8). The conference committee report explained that the "*Treasury 'backstop'*" was increased to match FNMA's total purchase authority, which was expanded to $2.25 billion by the Act (House Committee on Banking and Currency (1957), p. 16).

Emergency Housing Act of 1958 (Pub. L. 85-364)

Enacted: April 1, 1958

The Act, of stated purpose "*to stimulate residential construction*," increased the President's general special assistance authority by $500 million to $950 million. The Act also increased the supplemental special assistance function authorization for purchases of mortgages insured under Title VIII of the National Housing Act by $50 million to $500 million.[4] The act additionally created a new special assistance authority function for purchases of mortgages for low- and moderately priced housing insured under Title II of the National Housing Act or guaranteed under the Servicemen's Readjustment Act of 1944, with $1 billion authorized to be outstanding at any given time. The total increase in Fannie's purchase authority was therefore $1.55 billion.

[4] An additional program had been recently established under Title VIII: Section 809 mortgage insurance for civilian owner-occupied housing for employees of military R&D instillations (Pub. L. 84-574, enacted June 13, 1956).

The increase in FNMA's portfolio limit was enacted at the tail end of the recession that lasted from August 1957 through April 1958. The Act, and particularly the additional special assistance purchase authorizations, were seen as "*a way to spur housing during a recession*" (Hagerty (2012), p. 34). This near-term, countercyclical emphasis was underscored by the accompanying Senate committee report, which explained the bill was "*designed to encourage and expedite the construction and financing of a substantial number of new housing units*" (Senate Committee on Banking and Currency (1958), p. 1).

Housing Act of 1959 (Pub. L. 86-372)

Enacted: September 23, 1959

The Act increased the supplemental special assistance function authorization for purchases of Section 213 FHA-insured mortgages (cooperative housing) by $25 million to $225 million. The statutory limitation on the amount of the mortgage purchased under the special assistance functions was also increased from $15,000 to $17,500, while the loan purchase limit for secondary market functions was increased from $15,000 to $20,000 (FNMA (1969), pp. A38–A39).

The accompanying Senate Committee on Banking and Currency report characterized the Act as primarily motivated to address "*urban renewal and low-rent public housing*," and made clear that the bill was the result of a multi-year deliberative process, as opposed to an emergency response (Senate Committee on Banking and Currency (1959), p. 1). In testimony before the Housing Subcommittee of the Senate Banking and Currency Committee, Federal Reserve Chairman William Martin expressed concerns that the inflationary impact of strong post-war housing activity growth was intensifying, and that mortgage credit was dominating capital markets (FRB August 1959, p. 882). He also cautioned

against certain proposed provisions of the Act, notably discretionary decreases in down payments for FHA loans, "*at this time when mortgage lending and housing starts are at or near record levels and when growing pressures in the capital markets are being reflected in high and rising interest rates.*"

Housing Act of 1961 (Pub. L. 87-70)

Enacted: June 30, 1961

The Act increased the special assistance authority under the direction of the President from $950 million to $2.05 billion outstanding at any time, through several channels: a general increase of $750 million to $1.7 billion; a further increase of $207 million resulting from the transfer of remaining commitment and purchase authority for low- and moderately priced housing granted by Public Law 85-364 (the Act terminated this special assistance function); and an increase of $139.4 million, equal to the net decrease in mortgage positions under management and liquidation functions for FY1961 (FNMA (1969), p. C8). The Act also provided for further increases in each of the fiscal years 1962-1964 by the net decrease in mortgage positions under the management and liquidation functions. Ignoring the reshuffling of the preexisting low-income assistance authorization, the total immediate increase in purchase capacity would have been $889 million.

In his remarks upon signing the Act, President Kennedy hailed the bill as "*the most important and far-reaching Federal legislation in the field of housing since the enactment of the Housing Act of 1949*," enabling communities and developers to "*build the cities of tomorrow where families can live in dignity, free from both the squalor of the slums and the unbroken monotony of suburban sprawl*" with emphasis on "*long-term development of this country*" (Kennedy (1961)). Neither his remarks nor the bill's accompanying committee reports made mention of countercyclical

motivations or other short-term policy objectives. The Federal Reserve Bulletin also underscored that many of the Act's provisions "*are necessarily long-term in character*" (FRB December 1961, pp. 1383–84).

Housing and Urban Development Act of 1965 (Pub. L. 89-117)

Enacted: August 10, 1965

The Act legislated four staggered increases in the President's special assistance authority: an increase of $100 million upon enactment; an additional increase of $450 million on July 1, 1966; an additional $550 million on July 1, 1967; and an additional $525 million on July 1, 1968. The Act further increased general special assistance authority by an amount equivalent to what would otherwise be available for new commitments and purchases of mortgages under Title VIII of the National Housing Act, with $107.5 million transferred effective upon enactment.[5]

The accompanying conference committee report characterized the Act as primarily motivated to "*to assist in the provision of housing for moderate- and low-income families, to promote orderly urban development, to improve living environment in urban areas, and to extend and amend laws relating to housing, urban renewal, and community facilities*" (House Committee on Banking and Currency (1965), p. 1). In his remarks upon signing the Act, President Johnson emphasized new approaches to serving disadvantaged populations: "*The importance of the bill is not only that it retains and improves the best of good and traditional programs; it is a landmark bill because of its new ideas. Foremost and uppermost of these is the program of assistance for the construction and the rehabilitation of housing for the elderly and*

[5]An additional program had been recently established under Title VIII: Section Section 810 mortgage insurance for off-base housing of military and essential civilian armed services personal (Pub. L. 86-372, enacted September 23, 1959).

for families of low income—the people who live in the most wretched conditions in our slums and our blighted neighborhoods" (Johnson (1965)). His remarks made no mention of countercyclical motivation or other short-term policy objectives.

Loan Limit Decrease of 1966

Ordered: April 2, 1966

Public Law 88-560, enacted on September, 2 1964, had eliminated the statutory maximum limitation on the mortgage amount under the secondary market function. On April 2, 1966, the loan limit under the secondary market was administratively reduced from $20,000 to $15,000 "*to reduce the volume of mortgages then being offered for purchase and to conserve Corporation funds*" (FNMA (1969), p. A39). The Federal Reserve Bulletin noted that secondary market offerings of FHA/VA mortgages and Fannie's aggregate mortgage holdings had hit record highs, as mortgage credit was becoming tight, and FNMA was trying to preserve cash (FRB May 1966, pp. 644–645).

Participation Sales Act of 1966 (Pub. L. 89-429)

Enacted: May 24, 1966

The Act authorized Fannie Mae to package and sell participation certificates (PCs) backed by pools of loans and obligations made or acquired by other Federal credit agencies. Funds raised by PC issues on agencies' behalf would be available to those agencies to meet loan demands, thus reducing their reliance on borrowing or advances from the Treasury. Agencies' PC issues would require approval by an appropriation bill, and such approval would direct the Treasury to provide payment to FNMA for any PC insufficiencies (e.g., if PC interest payments exceeded the interest borne by the agencies' underlying obli-

gations). The Act would soon serve as the statutory basis for Ginnie Mae's MBS program after the Housing and Urban Development Act of 1968 split GNMA off from FNMA (see GNMA, Section 4.3). The Act also repealed the pending $450 million increase in the President's special assistance authority, authorized by the Housing and Urban Development Act of 1965, scheduled to take effect on July 1, 1966.

The Act's stated objective was to "*to promote private financing of credit needs and to provide for an efficient and orderly method of liquidating financial assets held by Federal credit agencies*," and the bill was intended as "*a major step in a shift from public to private financing of governmentally sponsored credit programs* (Senate Committee on Banking and Currency (1966), pp. 1–2). But in the short-run, the bill was also clearly motivated by trying to reduce Treasury's debt issues. The accompanying committee report explained that "*borrowing needs of the Government are expected to be large in the year ahead*" and in the prevailing interest rate environment, the Treasury would not be able to issue additional long-term debt except at rates above a prevailing 4.25% statutory cap.

That report also shed light on the privileged status of agency PCs, threading the needle between an explicit Treasury guaranteed versus de facto backing, while moving agencies' financing off the federal balance sheet and out from under the federal debt ceiling: "*The underlying obligations will be guaranteed by the agency establishing the trust, and timely payments of principal and interest on the certificates will be guaranteed by FNMA. FNMA's guarantee in turn is supported by borrowing authority from the US Treasury. Although the participation certificates will not be full faith and credit obligations of the United States, as a practical matter the moral obligation of the Government to back up these participation certificates is entirely*

clear. Because they are not Government obligations, they will be subject to State taxation, including State income taxes. They will be eligible securities to support Federal Government deposits. Since they are not Government obligations, they will not be subject to the Federal debt ceiling and they will not be subject to the 4.25-percent interest ceiling on Government bonds of 5 years or more" (Senate Committee on Banking and Currency (1966), p. 3).

Public Law 89-566

Enacted: September 10, 1966

The Act increased the cap on FNMA's secondary market facility leverage from 10 to 15 times its capital, surpluses, reserves, and undistributed earnings. The Act also increased the authorization for preferred stock issued to the Treasury by an additional $110 million. Using 1965 year end capital of approximately $415 million (FNMA Semi-Annual Report December 1965), the capital injection and leverage increase supported an expansion in the secondary market portfolio of up to $3.84 billion ($415 million × (15-10) + $110 million × (15+1) = $3.84 billion). The Act also increased special assistance authority for purchases of mortgages for low- and moderately priced housing insured under Title II of the National Housing Act or guaranteed under the Servicemen's Readjustment Act of 1944 by $1 billion, with half this sum deriving from $500 in new purchase and commitment authorization and the other $500 million transferred from a reduction in the President's general special assistance authority. Thus special assistance function purchase authority was increased on net by $500 million. The use of these special assistance funds were restricted to the purchase of mortgages for homes constructed after the date of enactment.

The 1967 Economic Report of the President explained that monetary tighten-

ing in 1966, intended to slow an overheated economy, had driven interest rates to 40-year highs, inducing a particularly sharp decline in residential construction activity (Economic Report of the President (1967), p. 6). By mid-1966, a steep drop in net savings flows to thrifts and a general credit crunch were dragging at housing starts and construction activity (FRB September 1967, p. 1481). The accompanying conference report stated that the Act's purpose was to "*stimulate the flow of mortgage credit for Federal Housing Administration and Veterans' Administration assisted residential construction*" (House Committee on Banking and Currency (1966), p. 1). In the same vein, the CQ Almanac characterized the bill as intended to ameliorate the effect of tight monetary conditions on the housing market: "*A pronounced slump in the housing industry was one of the most serious imbalances in the economy during 1966. S 3688 was intended to somewhat relieve this condition*" (CQ (1967)).

Loan Limit Increase in 1966, Elimination in 1967

Announced: October 4, 1966; February 3, 1967

With the increase in FNMA's purchase authorization pursuant to Public Law 89-566, Fannie was able to reverse course from conserving cash back to expanding purchases in support of the distressed mortgage market. The loan limit was increased on October 4, 1966 to $25,000 for new construction and to $17,500 for existing homes. On November 2, 1966, the ceiling on existing homes was increased back to $20,000.

On February 3, 1967, Fannie removed its standing loan limits for eligible secondary market mortgage purchases, which had been reduced from $20,000 to $15,000 in April 1966, and established that it would instead purchase FHA-insured mortgages up to FHA's loan limit. The loan limit for Section 203(b)

mortgages had most recently been increased from $25,000 to $30,000 by the Housing Act of 1964 (Pub. L. 88-560, enacted September 2, 1964). Unlike FHA mortgages, VA-guaranteed mortgages were not limited by a statutory ceiling, but various administrative purchase limitations were periodically imposed on loan size or the non-guaranteed portion of VA mortgages (see FNMA (1969), p. A40).

The Federal Reserve Bulletin noted that FNMA's net mortgage purchases had declined in late 1966 and early 1967, and that private mortgage market conditions had improved. FNMA also raised its purchase price in February and March 1967 "*in an effort to stimulate housing activity further*" (FRB September 1967, p. 1481). Offerings to FNMA started to pick up in May 1967, when private market mortgage rates started to decline in line with other market rates.

BIBLIOGRAPHY

Bartke, Richard W., 1971, "Fannie Mae and the Secondary Mortgage Market", Northwestern University Law Review 66(1): 1–78.

Congressional Quarterly Almanac 1953, 1954, "Housing Amendments", 9th ed., 04-190-04-192, Washington, DC: Congressional Quarterly.

Congressional Quarterly Almanac 1966, 1967, "Funds Provided FNMA to Help Housing Industry", 22nd ed., 811-15, Washington, DC: Congressional Quarterly.

Department of the Treasury, 1959, "Final Report on the Reconstruction Finance Corporation", Washington, DC: US Government Printing Office.

Eisenhower, Dwight D., 1954, "Statement by the President Upon Signing the Housing Act of 1954, August 2, 1954", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Elliot, Douglas J., Greg Feldberg, and Andreas Lehnert, 2013, "The History of Cyclical Macroprudential Policy in the United States", US Treasury Department Office of Financial Research, Working Paper No. 8.

Federal National Mortgage Association, 1969, "Background and History of the Federal National Mortgage Association", Washington, DC: Federal National Mortgage Association.

Haar, Charles M., 1960, "Federal Credit and Private Housing: The Mass Financing Dilemma", McGraw-Hill, New York, NY.

Hagerty, James R., 2012, "The Fateful History of Fannie Mae: New Deal Birth to Mortgage Crisis Fall", The History Press, Charleston, SC.

House Committee on Banking and Currency, 1957, "Housing Act of 1957: Conference Report to accompany H.R. 6659", Report No. 85-659, Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1965, "Housing and Urban Development Act of 1965: Conference Report to accompany H.R. 7984", Report No. 89-679, Washington, DC: US House of Representatives.

House Committee on Banking and Currency, 1966, "Expansion of the Purchasing Authority of the Federal National Mortgage Association: Conference Report to accompany S. 3688", Report No. 89-1868, Washington, DC: US House of Representatives.

Johnson, Lyndon B., 1965, "Remarks Upon Signing the Housing and Urban Development Act of 1965, August 10, 1965", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Kennedy, John F., 1961, "Remarks Upon Signing the Housing Act, June 30, 1961", Washington, DC. Source: Online by Gerhard Peters and John T. Woolley, The American Presidency Project.

Klaman, Saul B., 1961, "The Postwar Residential Mortgage Market", National Bureau of Economic Research, Princeton University Press, Princeton, NJ.

Senate Committee on Banking and Currency, 1937, "National Housing Act Amendments of 1937: Report to accompany H.R. 8730", Report No. 75-1300, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1953, "Housing Act Amendments of 1953: Report to accompany S. 2103", Report No. 83-455, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1957a, "Housing Act of 1957: Report to accompany H.R. 6659", Report No. 85-368, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1957b, "Interim Increase in Federal National Mortgage Association Borrowing Authority: Report to accompany H.J. Res. 209", Report No. 85-51, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1958, "1958 Emergency Housing Legislation: Report to accompany S. 3418", Report No. 85-1349, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1959, "Housing Act of 1959: Report to accompany S. 2654", Report No. 86-924, Washington, DC: US Senate.

Senate Committee on Banking and Currency, 1966, "Participation Sales Act of 1966: Report Together with Individual Views to accompany S. 3283", Report No. 89-1140, Washington, DC: US Senate.